# Contractors and Engineers Monthly

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## Highlights Of This Issue


- **New Trunk Sewer**
  Sections 102 and 103 of the new North Metropolitan Trunk Sewer to serve suburbs of Boston, Mass., involved the construction of two tunnels from a single shaft, one through clay and the other through gravel, while Section 105 of this project included 350 feet of subaqueous tunnel and 6,000 feet of open cut.
  See page 2.
- **Bridge Erection Novelties**
  Several features entirely new in steel erection were included in the construction of a new 615-foot steel and concrete bridge across the Cedar River in Waterloo, Iowa. This bridge was recently placed in service, much to the relief of cross-river traffic. See page 2.
- **Low-Cost County Roads**
  Madison County, Ala., has instituted a program of double bituminous surface treatment with tar to improve its highway system. Some 50 miles have been so improved and it is planned to continue this work so that by the end of next year no resident will be more than 4 miles from a treated road.
  See page 7.
- **Pennsylvania Turnpike**
  Our series on this outstanding project continues with a description of the construction of a 590-foot concrete and steel viaduct across the Raystown Branch of the Juniata river, with the necessary approach fills, and of the methods used on Contract 44, Section 13D, for over 1,000,000 yards of unclassified excavation and structures through Juniata Gorge. See pages 9 and 25.
- **Levees Rebuilt at Portland**
  The work of the U.S.E.D. Department of Flood Control in rebuilding and enlarging the levees which protect Portland, Ore., from floods is described in this issue. See page 22.
- **Trees Saved on Iowa Road Job**
  His unusual interest and care in preserving the trees and existing vegetation on a highway-widening project in Iowa won for G. H. Lowe, contractor, the Central Section Award in the 1939 Contractors and Engineers Monthly Roadside Development Awards.
  See pages 4 and 29.


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# Machine Grading With Short-Cuts

### Jahnig & Davis, Partners For 20 Years, Complete an Interesting Job from Lynd To Russell, Minn.

(Photo on page 44)

✦ WORKING a complete LeTourneau and Caterpillar outfit between Lynd and Russell, Minn., last summer were W. M. Jahnig and L. M. Davis of Britton, S. D., as fine a pair of partners as ever moved dirt. For twenty years they have worked together in this partnership, as Jahnig & Davis, Contractors, and are still on their "honeymoon" as they have their first argument or disagreement yet to come.

On the 6.5-mile grading contract, FAP 758-C, which was awarded them on the low bid of $73,600, these long-time associates used two 13-yard and one 12-yard Carryalls with D8's and RD8's to pull them, a Caterpillar No. 11 Auto Patrol, another RD8 with a LeTourneau bulldozer, a Caterpillar Thirty gas tractor with a Bros sheepsfoot roller, a Ford gas-tank truck carrying also the greasing outfit, and a Dodge pick-up. With this outfit they went to town, moving the 400,000 yards of unclassified excavation in the contract, with 440,000 station-yards overhaul beyond the 500 feet of free haul, well within the 165 contract days.

#### Slopes and Methods

The work was on a 150 to 300-foot right-of-way of which 140 feet was used

(Continued on page 12)

# Long Job in Short Distance Features Michigan Cut-Off

### R. B. Baker of Royal Oak Completed Double 22-Foot Slabs on Either Side of Boulevard Strip

✦ A LOT of concrete can be poured in a short distance when a boulevard highway is under construction in Michigan. On U. S. 10 at Birmingham, Mich., FA 258-G-2 relocates the highway around the town to complete the link of double 44-foot roadways with a 38-foot boulevard strip between from Pontiac into Detroit. The contract was awarded to The R. D. Baker Co. of Royal Oak, Mich., on its low bid of $167,608.52 for the 1.332 miles of paving. The pavement was poured as 22-foot 10-8-10-inch slabs with tie bars to the adjacent slab at 40-inch intervals and with the standard 2½-inch deep center strip, or plane of weakness.

Using a Ransome single-drum paver and a full paving crew, Baker averaged better than 800 feet of 22-foot thickened-edge slab with expansion joints spaced 120 feet and dummy joints at 30 feet, working 8 hours per day under a 44-hour-a-week regulation.

#### Rough Grade

The rough grade in this flat country was not a great item but was handled expeditiously with a Lorain 60A making the light cuts and loading to a fleet of double-drive rear-axle trucks with dual pneumatics. Wherever bad material was encountered the plans required removal to a depth of 1 to 3 feet and backfilling with porous material. This was done over about 70 per cent of the project where test borings showed poor base material.

#### Form Setting and Fine Grade

The grade was prepared where low by dumping suitable porous material and spreading it with an Allis-Chalmers Model K tractor and Baker bulldozer. The form crew consisted of five men who prepared the line and set the 10-inch Metaforms. Following this, riding on the forms, an R-B Finegrader cut the grade to the proper shape and grade, delivering the excess material outside the forms by means of the continuous single scraper conveyor. Operated by a Hercules engine, it pulled itself forward by two cables attached to the form pins ahead. Behind the Finegrader one man oiled the forms, using a pail of oil and a short handled dauber or window brush. One of the form crew with the foreman went back and tamped the forms and relined them as required just ahead of the paver.

#### Large Well-Planned Batching Plant

Sand and gravel were brought in by rail from the American Aggregates Corp. pits at Oxford, Mich., and spotted on a siding of the Grand Trunk Western about one mile east of the center of the paving contract. They were unloaded by a Link-Belt crane with a 40-foot boom

(Continued on page 16)

ONTARIO'S NEW SUPER-HIGHWAY

A traffic intersection west of Burlington, Ontario, on the Queen Elizabeth Way.
See page 10.

# New Metropolitan Sewer

## Clay and Gravel Headings Worked from Single Shaft By Silas Mason, Inc., On Sections 102 and 103

✦ WHILE driving the shaft for tunneling the 7,370 feet required in Sections 102 and 103 of the North Metropolitan Trunk Sewer under the streets of Chelsea, Mass., Silas Mason, Inc., found that Nature had made a distinct cleavage in the deposited materials at that very point. The shaft was located in a triangular area that could be readily fenced off at the intersection of two streets close to the center of the combined sections and at about the only available workable location. The 30 x 27-foot shaft is divided diagonally so that to the north there was a complete face of clay and the south heading was in coarse sand, gravel and stone.

Bids were opened on Sections 102 and 103 on February 23, 1939, and the two sections were awarded to Silas Mason, Inc., of New York on the low bid of $1,628,000. Work was started on March 20. The tunnels run approximately 3,700 feet to the north and an equal distance south, with 640 feet of open cut at the Section 102 end.

### Starting the Work

The triangular working area at the intersection of Everett Avenue and Third Street was first fenced off. Then the required buildings and a stiffleg derrick with a 70-foot boom were erected. The buildings include a 2-story storage house with the offices on the second floor, a hog house with the hospital lock and clinic on the second floor and the lockers and showers on the first floor, and the timekeeper's office. The derrick is electric driven and the operator's house has a wide glass front, giving him a complete unobstructed view of all that is going on at the shaft directly in front and the roadway adjacent from which he is required to pick up material for the headings as well as the steel sheet piling for the start of the shaft.

### The Shaft

Even before the shaft was started, it was necessary to lower the ground water in the vicinity of the shaft to permit working in the dry. This was accomplished by putting in three Layne-Bowler deep-well pumps at the shaft site pumping from 66 feet below the ground elevation. Another similar pump was located about 50 feet from the shaft. The result of the pumping was to lower the ground water elevation from 105 down to Elev. 75 in the gravel and down to Elev. 61 in the clay. Three 2-inch test pipes about 400 feet from the shaft were driven to determine the elevation of the water and they showed that the difference in elevation was only 1½ feet higher at that distance than at the shaft.

*Photo by Chet Orlowski*
**Preparing to lower the first shield in the Silas Mason contract for Sections 102 and 103 of the North Metropolitan Trunk Sewer in Chelsea, Mass.**

The 30 x 27-foot shaft was excavated within a shell of 16-inch Bethlehem DP1 steel sheet piling in 48-foot lengths driven to a 5-foot penetration below the shaft invert. At the start of the excavation for the tunnel the material was hand loaded to 2-yard skips, raised to the

(*Continued on page 38*)

## Section 105 With 6,000 Feet Of Open Cut and 350-Foot Subaqueous Tunnel Awarded To V. Barletta Co.

✦ WITH short tunnels under two railroads, another under the Felsway and a fourth under the Revere Beach Parkway, Section 105 of the North Metropolitan Trunk Sewer in Medford and Everett, Mass., offers sufficient variety, but as an added attraction the section includes a 350-foot tunnel under the Malden River, requiring compressed-air operation. The major portion of the work comprises 6,000 feet of open cut which of itself offered some interesting problems as it runs entirely through marsh and tidal flats parallel to the Revere Beach Parkway.

The contract was awarded to V. Barletta Co. on the low bid of $694,524 and work was started January 9, 1939. The upstream end of the job is an 8-foot 6-inch horseshoe section with a short section of tunnel under the Felsway. This section is about 2,400 feet long. Before tunneling under the B & M RR (Western Division), the size increases to a 9-foot 3-inch x 9-foot 3-inch section which continues to the Malden River siphon. Under the river the section changes from a horseshoe to two channels each 6 feet 8 inches high and 3 feet 6 inches wide, separated by a concrete wall, and the balance of the 12-foot tunnel filled with concrete. After it is excavated, the tunnel is lined with 5/16-inch steel liner plates and grouted outside to seal it against water seepage. The top of the tunnel is approximately 30 feet below the bed of the Malden River. About 1,000 feet downstream from the river tunnel, the size changes from a 9-foot 3-inch section to a 10-foot 6-inch section. These changes were made for the purpose of anticipating future connections for which provisions were made and stubs left for connections at a later date.

### Malden River Tunnel

The shafts for the river tunnel are 24 x 26 feet, one of which is about 65 feet deep, with an 18-foot diameter steel tunnel plate ring at the bottom. The tunnel itself is 12 feet outside diameter and 400 feet long. The first three rings of the west shaft were set by instrument and then concreted in. Following this the rings were made up plate by plate and the material excavated by a Lorain 75, one of two on the job and having 34-inch treads to make them web-footed for the soft ground over which they are called upon to operate. To handle the water in the west shaft, the contractor used a 4-inch LaBour pump, and another at times, removing about 10,000 gallons per hour.

For the compressed air work on the Malden River tunnel, Barletta installed a complete compressor house, and hog house with hospital lock. The hog house is 45 x 22 feet and contains the lockers, showers, hot water equipment, heating equipment and hospital lock. The compressor house measures 37 x 34 feet and houses the three compressors for the low air work. There is an Ingersoll-Rand steam machine belt-driven by an Allis-Chalmers motor, a Worthington compressor, a 2-stage machine belt-driven by a Westinghouse motor, and a Chicago-Pneumatic compressor with a General Electric motor. The compressors and motors are all skid mounted and bedded in a 12-inch concrete mat. The hydraulic jacks and pumps for this tunnel were furnished by Watson-Stillman.

### Open-Cut Section

About two-thirds of the job was handled with wood sheeting and the remainder with 19-inch web Bethlehem steel sheet piling in 24 and 28-foot lengths. The contractor received some good-natured kidding from friendly rivals when it was learned that he expected to drive the steel sheet piling with a McKiernan-Terry No. 7 steam hammer operated by a pair of Ingersoll-Rand portable compressors. The trick was turned successfully the first try with the use of an intermediate air tank to which both of the compressors delivered air. The hammer uses the air direct from the tank. Without the tank the two machines probably would not be able to handle the big hammer. The hammer is swung with a Byers crane on a 40-foot boom. The steel sheet piling is driven ahead into the sandy clay and then the material excavated with the Byers and a ¾-yard Owen bucket. No pile foundation is used

(*Concluded on page 14*)

# State Builds Bridge For Waterloo, Iowa

## New Concrete and Steel Structure Embodied Novel Features in Handling the Steel Erection

(*Photos on page 44*)

✦ ALTHOUGH Waterloo, Iowa, has had three concrete arch bridges, it has for many years needed another bridge to connect its two business centers north and south of the Cedar River. Recently the city secured a PWA grant for the partial financing of a 615-foot structure and then turned the construction over to the state highway department. The new structure is 615 feet long with one 105-foot span at each end and three 135-foot spans. Its three deck girders carry two 24-foot roadways and two 6-foot sidewalks, with separating curbs between. The design is simple with plain concrete piers relieved with horizontal grooves for architectural effect and with cantilevered girders.

### Abutments

The two abutments rest on H-beam piles. The first test pile was driven on March 10, 1939, a 35-foot long H beam at the northeast abutment. There the rock was as indicated in the blueprints. At the southwest abutment a 25-foot test pile, which was supposed to develop 35 tons bearing, drove with a maximum bearing of only 9 tons. It was spliced with a 12-foot piece and at the end of its driving just developed the required bearing. Three more 40-foot test piles were required by the Resident Engineer. The bed of rock was very irregular and full of faults so that the overburden varied from 20 to 35 feet to rock. The limestone in the river bed, on the other hand, was well weathered with practically no silt deposit, this probably being due to the presence of a low dam only 150 feet below the bridge which caused all high water to scour the rock clean. Following the results of the test piles, the remaining piles for the abutments were ordered and the work was then transferred to Pier 2 and in sequence northerly across the bridge. The basis of all operations was from the south toward the north end of the structure.

### Cofferdam and Footings

The operations at Pier 2 were typical of the work at the other three piers except that the excavation was slightly more at the other piers. There was no

(*Continued on page 34*)

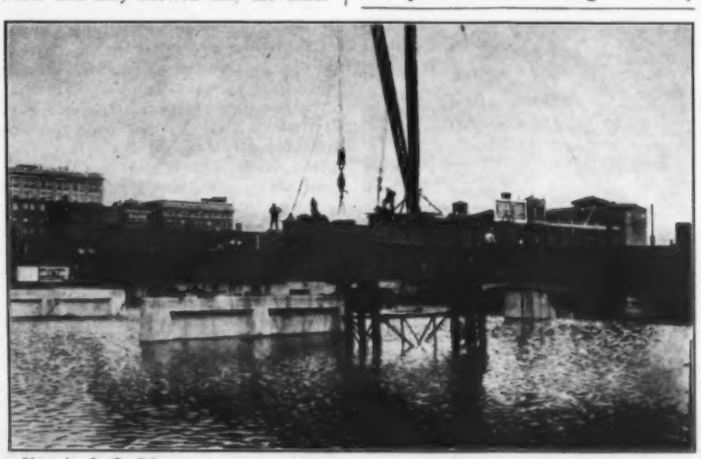


*Photo by R. E. Tabor*
**The falsework of six 12-inch H-beams carrying the jigger stick and traveler.**

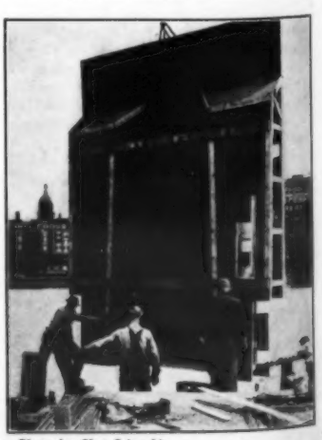
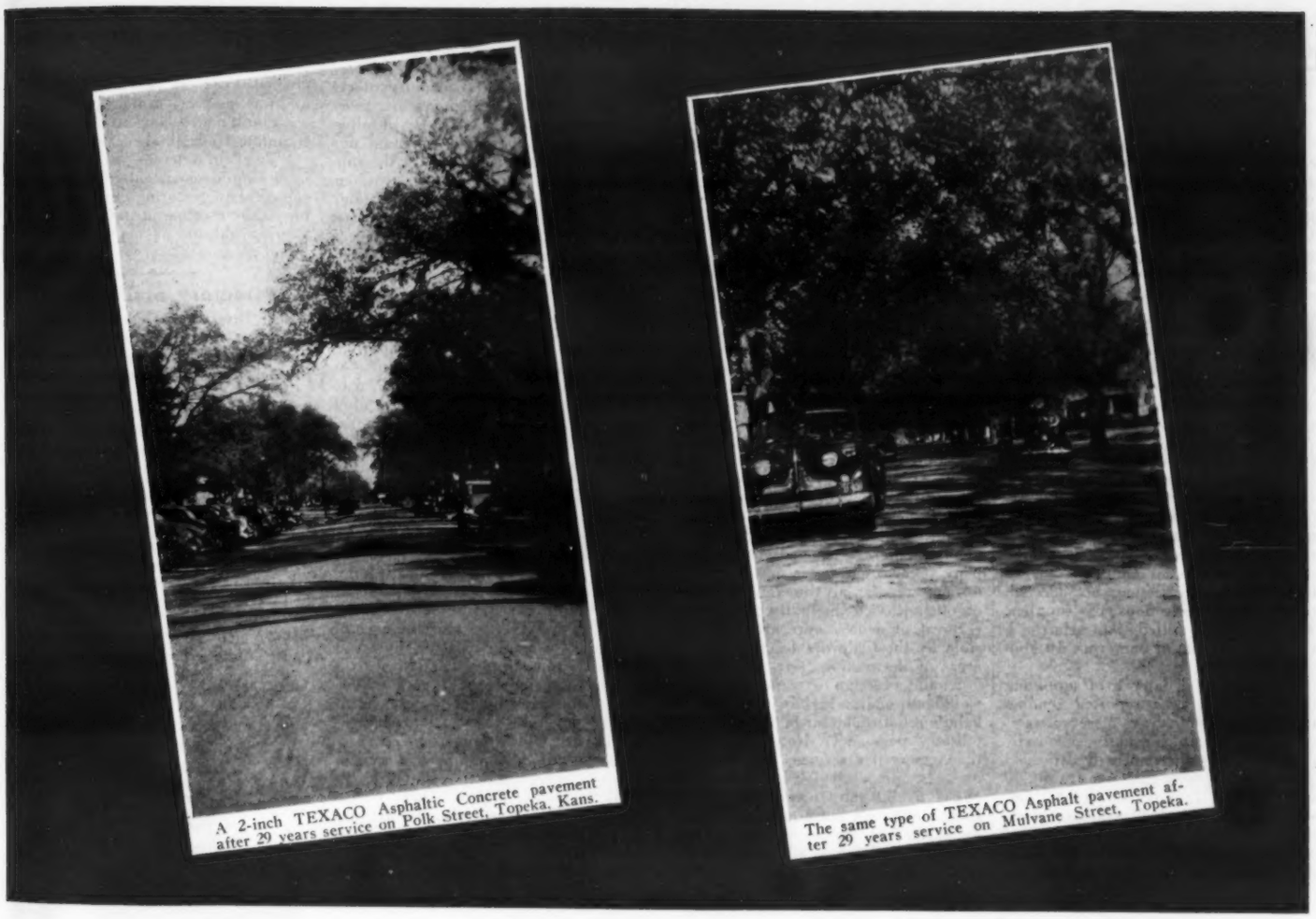


*Photo by Chet Orlowski*
**Lowering the center form panel for Pier 2 of the Waterloo Bridge.**

# TO THOSE WHO ARE INTERESTED

# IN PAVEMENT DURABILITY



A 2-inch TEXACO Asphaltic Concrete pavement after 29 years service on Polk Street, Topeka, Kans.

The same type of TEXACO Asphalt pavement after 29 years service on Mulvane Street, Topeka.

**Both the highway engineer and the contractor constantly ask themselves and others, "How long can this piece of equipment, or this material, stand the gaff?"**

**Here are two 29-year-old pavements in Topeka, Kans., which throw considerable light on the durability of TEXACO Asphalt.**

**For almost three decades, traffic has hammered away at these Topeka pavements, aided by the stresses of ever-changing climatic conditions. Not only have the TEXACO Asphalt pavements successfully withstood this acid test of time, but they continue to give satisfactory service today. Both pavements are of the TEXACO Asphaltic Concrete type, laid to a compacted thickness of two inches.**

**To the engineer, long-lived TEXACO Asphalt pavements such as these mean an attractively low annual cost. To the contractor, long-lived TEXACO Asphalt pavements are a sound basis on which to build a reputation for good workmanship.**

# TEXACO ASPHALT

**THE TEXAS COMPANY, Asphalt Sales Department, 135 East 42nd Street, New York City**

Chicago Cleveland Kansas City Houston Jacksonville Buffalo Philadelphia Richmond Boston

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## Highways As Aids in Disaster Relief

Each year some section of our vast country suffers from floods or other disaster. It may be some section of our Western Empire, New England, the Ohio River Valley, or the great Mississippi Valley. Tornadoes surge through the south or southwestern states, or earthquakes or fires bring suffering to communities where excess water is not the cause.

While all methods of transportation play a part in the great work of alleviating suffering, it is the highways which reach closer into the afflicted areas and are the final arteries of relief. In summarizing activities in disasters of recent years, the National Highway Users Conference mentions particularly the floods in the Ohio River Basin and in New England in 1936. "Soon after the extent of the disaster was known, nine trucks set out, bearing relief supplies, six with clothing for 300 persons, a large supply of mattresses and two tons of food." In nearby sections not affected, trucks made collections of supplies. Supply trucks rolled into Hartford, Conn., at the rate of one every 10 minutes.

The head of a dairy firm supplying the New York area reported sending trucks over the highways of seven states to collect milk which usually came in by train. Trucks that normally traveled 25 miles a day were forced to travel 500 miles a day. Tank trucks served Pennsylvania cities and Cincinnati, where the local water supplies were out of service. Fleets of 50 and 60 trucks in different sections carried food stuffs, the only food available for maintaining life among the inhabitants, poor and rich alike.

Where highways too suffered damage and bridges were wrecked, temporary repairs were made and new bridges were created by trained highway and bridge crews. In Louisville alone, highway transportation during a flood is credited with saving 100,000 persons from death, disease, injury or hunger. In California, during the disastrous floods of 1937 in the north and the 1938 flood in the southern part of the state, innumerable services were rendered by motor vehicles operating over the highways. Materials and equipment were transported to strengthen levees, railroad passengers were moved, emergency movement of perishable crops was effected with savings of thousands of dollars to growers, endangered inhabitants were evacuated, utility company repair crews were moved quickly to make repairs, all these and hundreds of other services including food, mail, removal of debris, were all made possible by the highways leading into the areas of devastation.

Should a foreign foe strike our shores, would our major highways be able to handle relief traffic for both civilian and military personnel? Noted for peacetime emergency service, our highways must be prepared for defending our coasts against any conceivable "blitzkreig," although the possibility of such an attack may right now seem remote. "Eternal vigilance is the price of liberty."

## Work by Contract Produces More Roads And Jobs Than WPA

H. B. Zachry of Laredo, Texas, President of the Associated General Contractors of America, recently told the House Roads Committee that highway contractors can create the same number of man-hours of employment and approximately twice the mileage of comparative types of highway with the same amount of money that the Work Projects Administration can. Mr. Zachry proposed that a substantial part of the funds to be appropriated for the WPA be appropriated for use by the Public Roads Administration for highways to be constructed under the contract system.

In speaking to the Committee, Mr. Zachry said, "I come before you as President of the Associated General Contractors of America to speak particularly for that group specializing in highway construction. I am not here pleading for an appropriation to maintain our existence as contractors, or for the support of our families and those of our workers. I am not here claiming that our government owes us a living, or that it should incur an increased debt to benefit our particular group.

"I am here to report to you that we highway contractors do justify and can further justify our existence as an industry on strictly economic grounds: that we fill and can better fill an important place in our nation. We know that for every thousand dollars appropriated to the Public Roads Administration, after being matched by the states with the amount required, approximately two men have been employed for one year; that when you reduce that appropriation $100,000,000, you have put 200,000 men out of a job. And likewise, when you increase it $100,000,000 you have created jobs for 200,000 men. We believe your good judgment will show you what the appropriation should be.

"We will produce with any sum transferred from WPA the same number of man-hours of employment to labor. We will give you approximately twice the mileage of comparative types of highways. We will contribute 3 per cent tax on our pay rolls to Social Security, 2 per cent to Old Age Pensions, and an undetermined amount to income tax. We will pay compensation and public liability insurance, approximately 10 per cent of the labor pay roll. We will pay property tax, corporate tax, and many other taxes."

Mr. Zachry then pointed out what is created by these additional miles of highway, as every dollar spent on highways built under the contract system will stimulate trade to the extent of $3.15.

"We again reiterate," said Mr. Zachry in closing his comments, "that any plan contemplating caring for the unemployed by creating unemployment in an existing industry is not any part of a sound economy."

"Ya can't tell 'em without a score-card!"

## Directory of Engineers

The Directory of New England Research and Engineering Facilities is the first book of its kind ever published and gives the facilities, experience, industries served, and types of services rendered by each of the firms listed, with the educational and business background of each key member of the firm. There is an index by types of services, by which any one may discover a consultant for any one of 1,300 different services.

Compiled by the Committee on Industrial Cooperation of the Engineering Societies of New England in cooperation with the New England Council, this Directory may be secured from the Engineering Societies of New England, Inc., 715 Tremont Temple, Boston, Mass. The price of single copies is 50 cents.

### "WORKMEN, SPARE THAT TREE"

**The outstanding contribution to roadside development made by G. H. Lowe of Cedar Rapids, Iowa, winner of the Central Section Award in the 1939 CONTRACTORS AND ENGINEERS MONTHLY Roadside Development Awards, was his unusual care in preserving trees on a highway-widening project in Iowa. 1. A row of elms and maples, showing the shallow ditch for drainage constructed behind them. 2. Lowe carefully left mounds around the trees to preserve them as the ditch was cut behind them. 3. In the distance, a cluster of trees in front of the ditch, with a small parking area constructed between the trees and the road. 4. G. H. "Stub" Lowe. 5. A stand of trees left along the widened highway.** **See page 29.**

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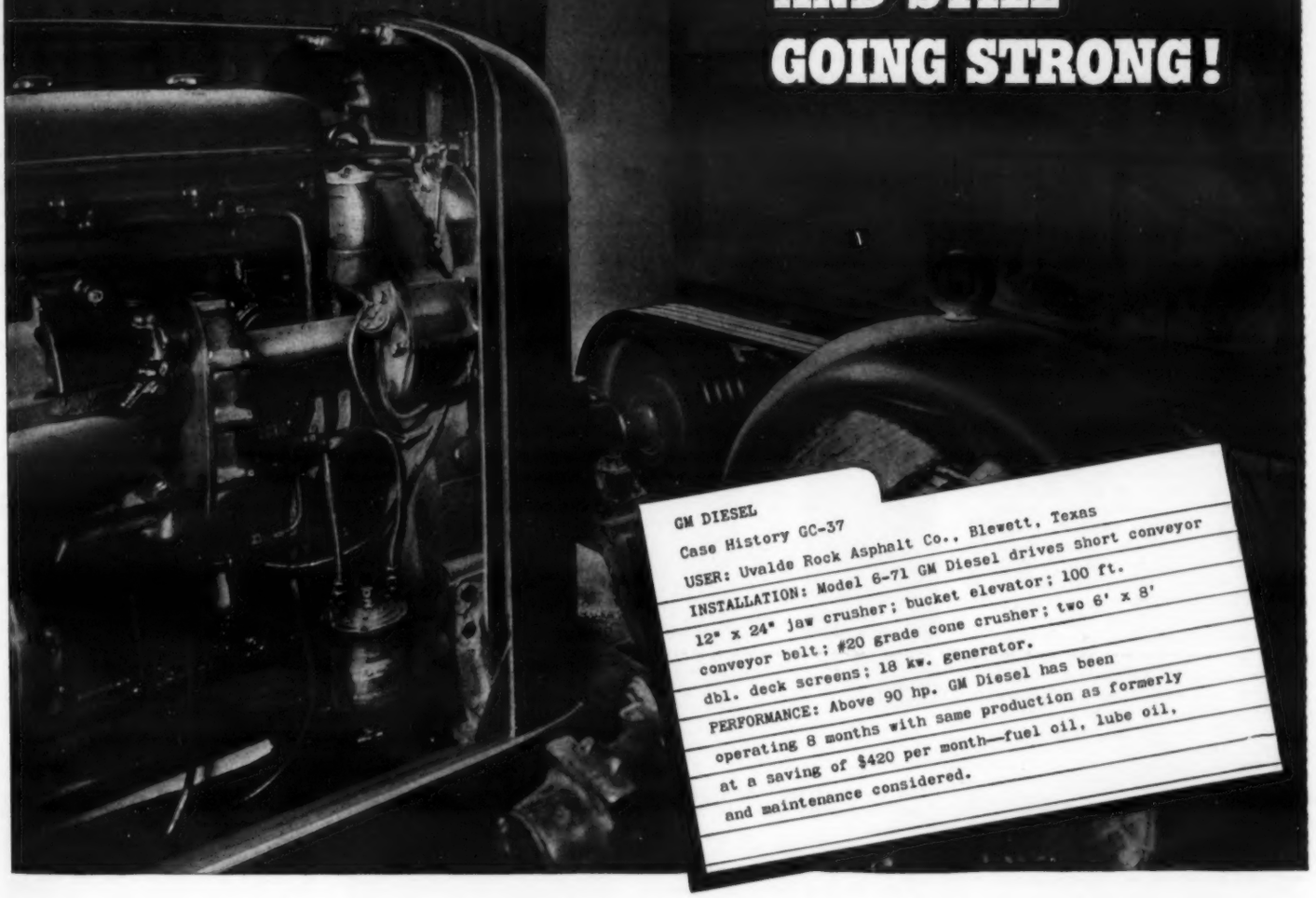
# $3,360 SAVED...

## AND STILL GOING STRONG!


GM DIESEL
Case History GC-37
USER: Uvalde Rock Asphalt Co., Blewett, Texas
INSTALLATION: Model 6-71 GM Diesel drives short conveyor
12" x 24" jaw crusher; bucket elevator; 100 ft.
conveyor belt; #20 grade cone crusher; two 6' x 8'
dbl. deck screens; 18 kw. generator.
PERFORMANCE: Above 90 hp. GM Diesel has been
operating 8 months with same production as formerly
at a saving of $420 per month—fuel oil, lube oil,
and maintenance considered.

ONE GLANCE at this case history and you can see what a whale of a job this Diesel is doing—and at what a whale of a saving!

Still, that's only part of the story.

Consider the operating conditions—in Texas heat and abrasive rock dust. Its owners estimated it couldn't take it for more than three months.

But as this is written—eight months later—that GM Diesel is still on the job, pouring out its thrifty power as faithfully as ever. And as for maintenance, they haven't had to replace or remove even an injector.

You can imagine how pleased they are with performance like that—on top of savings that already total $3,360! They're so pleased, in fact, they're installing another GM Diesel in another crusher and hope to double those savings as a result.

Here is a typical example of the economy and dependability that have put so many GM Diesels to work throughout the engineering and construction field. Here new standards of performance are being raised and costs reduced to an almost unbelievable degree.

A major reason is the General Motors 2-cycle principle on which the GM Diesel is designed—a principle that offers better lugging qualities, more constant speed with varying load and is also easier to operate than engines of previous design. And due to its basic simplicity and its interchangeability of parts, service problems are conspicuously minimized—a particularly important feature in isolated locations.

That's why it pays to specify GM Diesel power in your original equipment. Your equipment manufacturer has the facts about that.

And for replacement in your present equipment—or for powering portable and stationary applications of every sort—there's a GM Diesel dealer near you who has all such facts you need.

Write now for his name and address to:

**Dept. 105-D**
**DIESEL ENGINE DIVISION**
**General Motors Sales Corporation**
**Cleveland, Ohio**

**GENERAL MOTORS DIESEL**

GM GENERAL MOTORS DIESEL POWER

SEE THE DIESEL EXHIBIT AT THE GENERAL MOTORS BUILDING IN THE 1940 NEW YORK WORLD'S FAIR

The new Snow Liner being tested on an Oneida County, Wis., road this winter.

## World's Biggest Plow On Largest Tractor

The world's largest snow plow, mounted on the largest tractor ever manufactured, having successfully passed very exacting tests on a snow-blocked road in Oneida County, Wis., is now on display at the Drott Tractor Co., Milwaukee. This plow was designed by E. A. Drott and was built to his specifications by the Wausau Iron Works of Wausau, Wis.

Christened the Snow Liner, this new piece of equipment is not exactly a plow but is rather a bank widener, being designed to follow and widen the cut after a plow has cleared out the center of a road. It has one working blade, widening one side of the road at a time, while the other blade serves only to clear the way for the tractor crawlers. It can, however, widen a road more than 18 feet in a single trip, and piles up banks from 20 to 25 feet high.

The Snow Liner has an overall length of 34 feet, is 14 feet 5 inches high, and weighs about 15,000 pounds. It is mounted on a new Model HD-14 Allis-Chalmers tractor, the largest-size tractor made. This tractor is powered by a General Motors 2-cycle diesel engine with 108 drawbar hp.

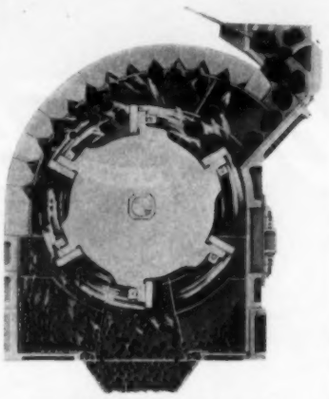
## LeTourneau Georgia Plant Opened; Doubles Facilities

The new subsidiary of R. G. LeTourneau, Inc., known as the LeTourneau Co. of Georgia, has completed its new all-steel office and factory buildings in Toccoa, Ga. Designed for the manufacture of the recently developed Tournapull, this new all-welded steel plant practically doubles the present LeTourneau manufacturing facilities.

All sales and distribution of equipment will be controlled by the parent company at Peoria, Ill., while the Stockton, Calif., plant will serve as an efficient service and distribution center west of the Rockies.

## Better Size Control With Impact Breaker

Reducing stone by breaking for concrete or road work is in itself a large activity in construction today. The Kubit breaker of Iowa Mfg. Co., Cedar Rapids, Iowa, uses impact for breaking the stone, giving a cubical product of all grades of stone at a comparatively slow speed. The Kubit breaker consists of a large diameter shaft of high tensile alloy steel with a machined square section to receive the discs which hold the manganese steel hammers.



How the Kubit breaker works.

The shaft rotates between the upper and lower casings. The upper casing consists of a series of interchangeable reversible and easily renewable breaker bars which form the roof of the machine, and are of high grade manganese steel. The side frames are a heavy mild steel to which are bolted manganese steel liner plates. The lower casing is of cast semi-steel, heavily ribbed to insure the necessary strength and rigidity.

The action of the Kubit breaker is that the hammers strike against the stone as it comes down the feed chute and project it against the breaker bars forming the roof of the machine. The process is repeated a number of times as the stones rebound. The ratio of reduction is controlled by the force of the blow which the stone receives, which is governed by the speed of the hammers. Consequently, the size of the product is regulated solely by the speed of the machine.

Bulletin K-1 issued by Iowa Mfg. Co., describes the Kubit principles, gives specifications for this impact breaker, results and tests of the Kubit breaker and the advantages of Kubitized stone as well as other worthwhile information. Copies of this bulletin will be sent free to those writing the manufacturer.


A Complete Line OF ASPHALT PLANTS

500 lb. Batch Capacity Plants
1000 lb. Batch Capacity Plants
2000 lb. Batch Capacity Plants
3000 lb. Batch Capacity Plants
4000 lb. Batch Capacity Plants
6000 lb. Batch Capacity Plants

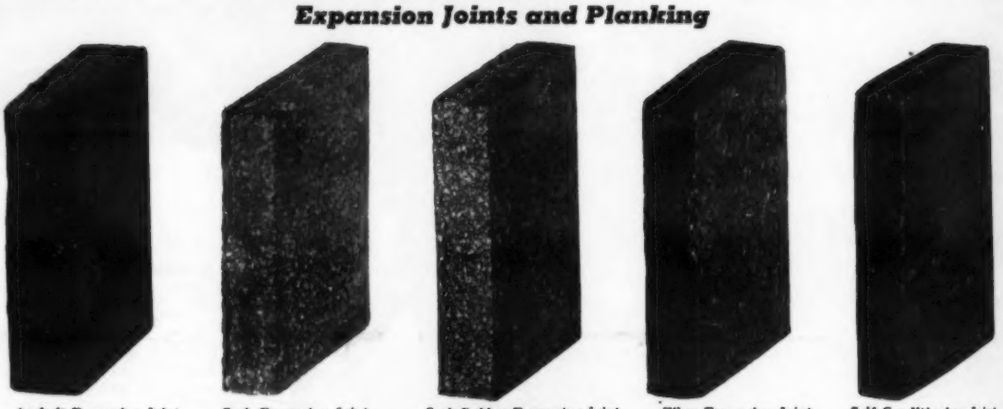
Madsen offers you 25 years of continuous manufacturing experience in asphalt plants, dryers and appurtenant equipment. If you want the plant that makes the record, you will want a Madsen Plant. Write for catalog.

MADSEN IRON WORKS
5631 Bicket Street
HUNTINGTON PARK, CALIFORNIA



ROAD CONDITIONING PRODUCTS

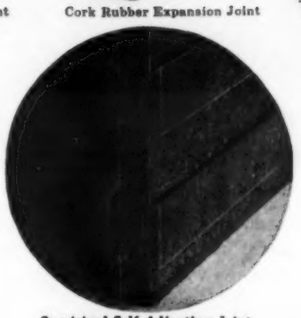
Expansion Joints and Planking



Asphalt Expansion Joint | Cork Expansion Joint | Cork Rubber Expansion Joint | Fibre Expansion Joint | Self-Conditioning Joint

Six Reasons Why SERVICISED Self-Adjusting Joint Is Better:

1. The asphalt ribs on the Self-Adjusting joint contact when the water seal is most important, nor can this compound ooze from the crevice.
2. The asphalt rib enables the product to fill the opening 100% at all times.



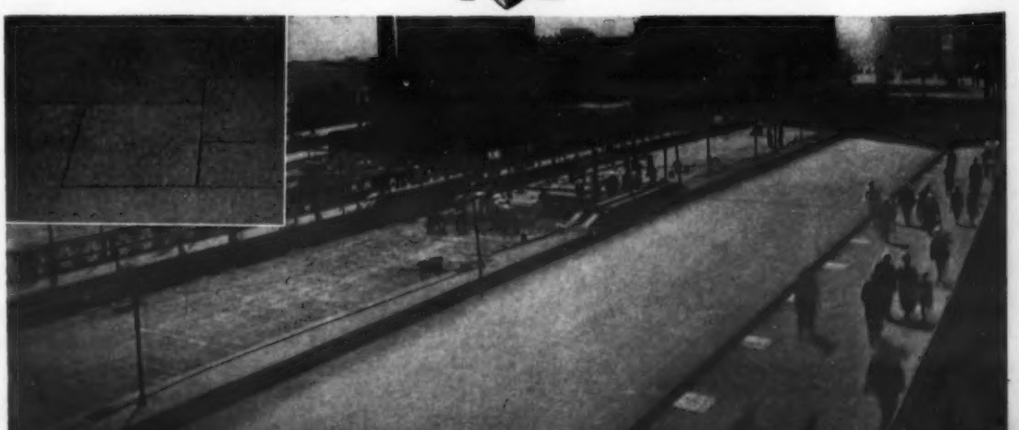
Servicised Self-Adjusting Joint

3. Compression intensifies resistance to inflow of moisture.
4. Recovery is aided by mechanical means ever-present and ever-functioning.
5. Uniform impregnation of the fibre with a non-sticky waterproofing material prevents adhesion of the fibre structure upon compacting.
6. Much less breakage due to handling because of reinforcement of the asphalt ribs.

SERVICISED PRODUCTS CORP.

MANUFACTURERS AND ENGINEERS
6051 West 65th St.

REPRESENTATION IN PRINCIPAL CITIES
Chicago, Illinois



Michigan Ave. Bridge, Chicago. Servicised Rock-surface Non-skid Plank protects traffic on this highly important artery. Servicised Standard Plank provides the wearing surface for pedestrian traffic. Inset: Detail Mineral Rock surface Planking.

# Most Road for Least Money Aim of Madison County, Ala.

## County Road Work Includes Building Culverts, Bridges And Pipe as Well as More Than 50 Miles of D.B.S.T.

(*Photos on page 44*)

✦ THE stranger in Huntsville, Alabama, the county seat of Madison County, is quite likely to be shown the big spring in the center of the city. This spring furnishes all the water for the needs of the city, and in addition supplies a stream which flows through the heart of the community. Mammoth trout swim somewhat lazily in this stream and eat the bread cast upon the water by the admiring citizens on the banks. However, before long, the talk would be sure to drift around to the improved road system which the county has been building during the past few years under the direction of the Board of County Commissioners.

With a county road system approximately 1,000 miles in length, the Commissioners have concentrated on the improvement of the most important local roads which include main routes to market and the sections through towns and villages.

In order to carry on the work, the county is divided into five districts, each under the general direction of a member of the County Board. The engineering work is under the control of the County Engineer, who is appointed by the Board, while the general coordination of the various projects is handled by the Chairman of the Board. There is a county shop in each district which houses the equipment used to maintain the local unsurfaced roads. This equipment consists of a tractor and grader outfit, two patrol graders, and four or more trucks. A central warehouse and shops are maintained at Huntsville. In addition to the machinery needed for the maintenance of the local roads, the county owns and operates three rock crushers, three draglines, one shovel, and other earth-moving equipment used in the improvement of the main roads.

Since 1937 the county forces have built 538 bridges and culverts ranging from 6 x 3-foot box culverts to one 240-foot bridge with eight 30-foot spans, all of the structures having a 24-foot clear roadway. All drainage structures meet Alabama State Highway Department specifications. The bents and abutments are of rock masonry. In addition to this work, 918 minor drainage structures have been built. The county has used approximately 10,000 cubic yards of Class A concrete and 27,000 cubic yards of rock masonry. The county has also made and used nearly 35,000 linear feet of concrete pipe. For the construction and maintenance of highways they have produced and used 525,000 cubic yards of pit-run gravel and 190,000 cubic yards of crushed stone.

### D. B. S. T. Work

Since 1936 something more than 50 miles of the more heavily traveled roads have been improved with a double bituminous surface treatment. The major portion of this work has been done with tar, although a small amount of asphalt emulsion has been used.

The county road to be improved is thoroughly inspected and definite plans made for the construction of needed drainage structures and the correction of bad drainage conditions. Usually the alignment is not disturbed, although sharp curves and excessive grades are corrected. Good practice in secondary road construction is adhered to but, on the other hand, excessive cost on any individual project is discouraged. The object has been to get as many miles of improved road as possible with the money available and still adequately maintain the remainder of the county system. In other words, the error of spending a lot of money in one spot and neglecting the rest of the system has been avoided.

Roads which are not considered strong enough to support the traffic expected on them are strengthened by the construction of new foundations. These are usually of macadam, using the crushed stone produced by the county. The foundation surface is well bonded, tight, and hard before the application of the tar prime coat. The roads are treated

(*Concluded on page 27*)

One of Madison County's recently improved roads

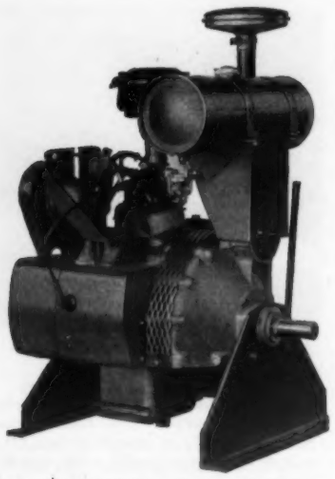

**Are You Tired of Pump Headaches?**

Marlow Pumps give continuous and genuine satisfaction. Sizes 1½" to 10" self-priming centrifugal. Also diaphragm and plunger pumps.

*Ask for Bulletin CEM-42*

**MARLOW PUMPS**
Ridgewood New Jersey

WHAT IT TAKES TO DO THIS
LORAIN
HARRISON CONSTRUCTION CO.
COMES FROM THIS!
Ability To Concentrate Full Power ... When and Where You Want It
• Lorain shovels can spot or spread their power as the digging demands. That's because their Thew Center Drive turntable offers direct power drive to each major power shaft. It is this direct-to-the-point power application, through the fewest number of parts, which enables you to—
1 Concentrate full engine power on any one operation to lick the toughest going (as above).
2 Distribute power over two or three simultaneous and synchronized operations to obtain smooth, fast, powerful working cycles.
For further evidence of the money-making advantages of Center Drive design, write today for book entitled "The Rocky Road To Success." You'll find facts aplenty to substantiate Lorains' reputation as real rock shovels.
THE THEW SHOVEL CO.
LORAIN, OHIO
LORAINS
THEW CENTER DRIVE



The power take-off end of the new Waukesha Cub Twin power unit.

## Air-Cooled Engine In 5 to 12-Hp Range

The new Waukesha Cub Twin power unit is designed for use with transferring or unloading pumps, small generators, small concrete mixers, as large-engine starting units, or for general utility with any piece of equipment requiring power in the 5 to 12-hp range.

The Cub Twin engine is a two-cylinder gasoline unit of L head construction, utilizing horizontal opposed airplane-type cylinders which are amply finned to provide adequate air cooling. With a 3-inch bore and 2¾-inch stroke, it develops a maximum of 12 hp at 3,600 rpm. Despite its light weight, the engine is of rugged construction. The crankcase and cylinders are a single casting of Waukesha chrome-nickel alloy, which provides a rigid foundation for the entire structure, while the crankshaft is a heavy steel forging, heat-treated, ground and polished, and running in two wide steel-backed babbitt-lined main bearings. The flywheel and blower are a unit casing, the blower having a capacity of 700 feet a minute at 3,600 rpm, which provides an adequate volume of air passing the cooling surfaces. Maximum speed is accurately controlled by the Cub Twin variable-speed flyball-type governor which also permits low speed idling. In addition, a throttle is provided which regulates the engine speed between idle and 3,600 rpm.

Additional information on the new Waukesha Cub Twin Model 150-U power unit is contained in Bulletin No. 1184, copies of which may be secured by those interested direct from the Waukesha Motor Co., Waukesha, Wis.

## Dirt-Moving Unit For Speedy Hauling

The 9½-yard Wheeler, made by the Koehring Co., 3026 W. Concordia Ave., Milwaukee, Wis., consists of a loading, hauling and dumping scraper of the semi-trailer type pulled by a Koehring tractor, and is designed for high travel speed, either loaded or empty.

It is stated that under most conditions only 30 seconds is required for a full pay load when a pusher tractor is used. The Wheeler body rests flat on the ground during loading, the depth of the cut being controlled by the operator by an independently operated cable. Side cutters widen the cut to the outside width of the rear tires to give a clean square cut. The air-controlled front apron is easily raised or lowered to suit the depth of cut and to prevent spilling.

Travel speeds as high as 20 miles an hour are possible, depending upon the engine equipment and the condition of the haul road. Large pneumatic tires and an oscillating front axle provide high speed over rough roads. The stability base area is an inclined plane from the rear wheel ground contact to the oscillating hitch about 4 feet above the ground. This places the center of gravity close to the stability base area, affording maximum stability for high-speed travel.

The front apron is easily controlled for any opening desired, within the ample travel limit, for a quick release of the load. Positive, quick and clean ejection of the dirt from the body is accomplished by the forward movement of the rear apron, pivoted at the cutting blade. Movements of both aprons are independently controlled, the front apron by a fast-acting air cylinder and the rear by the positive cable control. The body can be raised to provide 21 inches clearance under the cutting edge for free dumping.

One of the features of the unit is the "non-raring" hitch which is attached to the tractor below and ahead of the drive axle. As the pull increases, the grade grip of the front tractor wheels becomes more positive. Free universal action is provided at the upper end of the hitch-yoke, which allows the Wheeler body and tongue to move without twisting strains in any direction. Large pneumatic tires provide ample traction. The tractor tires are demountable and interchangeable with the tires on the wheels of the Wheeler.

The Koehring Wheeler is available in three models, the WH-95 powered by a 4-cylinder 4⅝ x 6-inch gasoline engine developing 85 hp at 1,650 rpm; the Super Model WHS-95, equipped with a 6-cylinder 4⅝ x 6-inch gasoline engine of 107 hp at 2,000 rpm; and the Model WHD-95 powered by a 4-cylinder two-cycle 4¼ x 5-inch diesel engine developing 107 hp at 1,800 rpm.

A new catalog describing and illustrating the features of the Koehring Wheeler may be secured direct from the manufacturer.

## New Link-Belt N. Y. Office

Announcement has been made by the Link-Belt Speeder Corp., Chicago, Ill., of the opening of a New York office at 856 E. 136th Street, to handle the sales and service of Link-Belt Speeder shovels-cranes-draglines in that territory. This new office is located in the building of the Clyde Iron Works, which now handles the sale of the heavier-type 1½ to 2½-yard Link-Belt Speeder machines for the industrial field in that area.

E. H. Kliebenstein, well-known in the construction trade, is in charge of the new office.


1869 Penco CORRUGATED METAL CULVERTS

Easily installed—no delay and no maintenance. Guaranteed to meet U. S. and State Highway Specifications.

Durable . . Permanent Low Cost

Phone or write PENN METAL CORPORATION OF PENNA. Oregon Avenue & Swanson Street, Philadelphia, Pa.



HOW THREE BROTHERS BUILT OUTSTANDING CONTRACTING SUCCESS WITH GARDNER-DENVER EQUIPMENT

*This Gardner-Denver "ABJ" Compressor is helping to pile up profits for Lowdermilk Brothers.*

Lowdermilk Brothers Beat Time Limit by Four Months on Big Monarch Pass Job

With a time limit of March 20, 1940, on their Monarch Pass job, Lowdermilk Brothers have "poured it on" with four Gardner-Denver UM-89D Wagon Drills and 21 S-55 Sinkers—finishing the job November 15, 1939, four months ahead of time, working on a two-shift-per-day, seven day basis.

This $485,000.00 job with 800,000 cubic yards, nearly all hard rock, was started May 6, 1939. Examination of Gardner-Denver drills used by Lowdermilk Brothers shows only ordinary wear, and repairs have been very minor. The D-13,000 Diesel engine fuel consumption on the "WBH" outfit runs about 4 gallons per hour, while using four S-55 Sinkers, and the "ABJ" Air Compressor—D-17,000 Diesel engine consumed about 6 gallons of Diesel fuel per hour.

Close bidding—with the aid of Gardner-Denver equipment—has enabled the three Lowdermilk brothers, of Denver, Colorado, to achieve outstanding contracting success within six years after starting "from scratch."

In 1934, Lowdermilk Brothers purchased their first Gardner-Denver equipment—a Gardner-Denver "AAG" Air Compressor and three S-55 Sinkers. This was their first venture as independent contractors. The "AAG" was followed by three Gardner-Denver "WBH" Compressors, a "WBQ" and an "ABJ"—providing a total air output of 2400 c. f. m. All units but the "WBQ" Compressor are Diesel engine powered.

Within the short space of six years these three brothers have handled $2,300,000.00 worth of contracts, including Cochetopa Pass, Starbuck, Big Townsend, Estes Park, North St. Vrain, Leadville, Canyon City, Fairplay and Ouray.

Lowdermilk Brothers have used Gardner-Denver equipment on all their contracts. They say, "We hope the next job is bigger so we will have to buy more."

Write for Bulletins on Gardner-Denver profit-producing equipment. Gardner-Denver Company, Quincy, Illinois.

*Showing the Gardner-Denver UM-89D Wagon Drills on the Monarch Pass job.*

GARDNER-DENVER SINCE 1859

# Concrete Handling On Turnpike Viaduct

## Structure Spans Branch Of Juniata River; Built By York Engineering Co.; Steel Work by Phoenix

+ CONTRACT 20, Section 13B, for the construction of the 590-foot concrete and steel viaduct across the Raystown Branch of the Juniata River with the necessary approach fills, about midway between Bedford and Everett, Pa., was awarded by the Pennsylvania Turnpike Commission to York Engineering Co. of York, Pa., on May 4, 1939, on its low bid of $326,209.62, for completion within 200 calendar days. Within the section, which is 4,071 feet long, the work required moving 200,000 cubic yards of unclassified excavation and borrow, placing 3,070 cubic yards of Class A concrete, 2, 425 cubic yards of Class B concrete with 615,000 pounds of plain steel bar reinforcing, and the viaduct superstructure of 1,500,000 pounds of fabricated structural steel.

### Design of Viaduct

The viaduct is 56 feet wide between curbs and approximately 60 feet wide overall. Running in a general east-west direction, it has three river piers numbered 1, 2 and 3 from the west abutment, with plate-girder spans of 100, 125 and 100 feet successively from the west abutment. Following this are five land piers lettered A, B, C, D and E and then the east abutment. The six spans starting from River Pier 3 to A and then A-B, B-C, C-D, D-E and E to the east abutment are successively 43 feet 8¼ inches, 40 feet 5¼ inches, 40 feet 10½ inches, 45 feet, 50 feet, and 44 feet 6¾ inches. All of these are I-beam stringers carrying the deck between piers. Between Piers C and D is a railroad, while between D and E is a township road. The entire viaduct is on a 2-degree curve and carries a super-elevation of ⅜-inch per foot of width. Piers C and D have 1-foot 4-inch-thick collision walls carried 9 feet above the top of the footings.

### The Land Piers

Each of the land piers, A, B, C, D and E, have three footings, each 5 feet 6 inches x 6 feet in area. Each footing supports a leg 5 feet wide and 3 feet 6 inches thick. The legs average 16 feet in height, but there is an actual variation in their length, as the super-elevation of the structure is taken care of in the length of the legs or piers. The cap or top beam is 3 feet 9 inches thick and 56 feet 9 inches long, being arched with about 2-foot rise between the legs not only to strengthen the structure but also to give a pleasing architectural effect. This arched beam is 6 feet 6 inches high from the top of the arch to the top of the cap.

Piers A, B, D and E have concrete 7½ inches thick x 2 feet 6 inches wide poured on top after the bearing plates were set, shimmed and packed for grade and super-elevation. Pier C takes the expansion of the structure and has a different type of shoe, for which the concrete was poured first, rubbed and then the plate set.

*C. & E. M. Photo*
**The Clyde Whirley electric derrick which handled forms and concrete for most of the viaduct between Bedford and Everett, Penna.**

### The River Piers

Piers 1, 2 and 3, the first three from the west abutment, are solid piers, No. 3 carrying the outer end of the third plate

(*Concluded on page 28*)


Kinney

**BITUMINOUS DISTRIBUTORS**

When you purchase a Kinney Distributor you get a machine that measures bitumen accurately on to the road surface; simple piping, simple, easily operated controls; pump, engine, and valves easily accessible for proper care by the operator; good weight balance to cut your tire expense; and important safety features.

Write for Bulletin A 1940—learn why those who know buy Kinney; (they have been since 1910!)—address, Kinney Mfg. Co., 3531 Washington Street, Boston, Mass.

Kinney

**'WAY BACK IN MAY, 1933**
**we advertised the fact that**
**"WE LIKE 'EM HARD-BOILED"**

We still do. We *want* to be made to prove our case. And what we said about industrial purchasing *then* applies with even greater force today. Demand proof of quality and service. When we say TRU-LAY Preformed lasts longer—is safer for your men to handle—*make us prove it*. When we say TRU-LAY Preformed resists kinking, spools better, whips less or saves sheave wear—*make us prove it*. Be **hard-boiled** about it. We'll come through with proof. We've collected gobs of it during the past sixteen years. Convincing hard-boiled buyers is the way we hatch our best customers. Shrewd and careful buyers invariably specify TRU-LAY Preformed once they have used it. And shrewd buyers always—

**BUY ACCO QUALITY** *whether it is American Cable's Tru-Lay Preformed Wire Rope—American Chains (Weed Tire Chains, Welded and Weldless Chains)—Campbell Abrasive Cutting Machines—Wright Hoists—Page Wire Fence—Page Welding Wire—Page Traffic Tape—Reading-Pratt & Cady Valves—or any other of the 137 ACCO Quality Products.*

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**WILKES-BARRE, PENNSYLVANIA** •

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**AMERICAN CHAIN & CABLE COMPANY, Inc.**

# New Super-Highway Along Lake Ontario

## Queen Elizabeth Way Built By Province of Ontario to Connect Toronto and U. S. With Boulevard Route

By A. A. SMITH, Chief Engineer, Ontario Department of Highways

(*Photo on page 1*)

✦ THE Queen Elizabeth Way is an entirely new route being built to connect Fort Erie, just across the U. S.-Canada border from Buffalo, N. Y., with Toronto, the capital of Ontario. Her Majesty Queen Elizabeth graciously consented to open a portion of this route during the visit of Their Majesties to Canada last summer.

Access to the Queen Elizabeth Way from Buffalo, Niagara Falls and Lewiston, N. Y., will be by international bridges at those points. The new route lies a half mile west of Niagara Falls and skirts the northerly limits of the city of St. Catharines, passes Hamilton to the east, crosses the Burlington Beach and thus reaches Toronto without passing through any large centers of population. The total distance will be about 95 miles and it is hoped that the lack of settlement along the road will permit quick and easy travel.

### Design of New Route

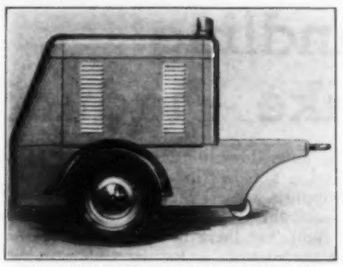
The route will be a divided highway for its entire length, with practically all the main intersecting roads taken over or under the Way. Bridges over streams and canals will be divided by a boulevard strip. On the 4-mile section immediately west of Toronto, the road will be of a strictly limited character, with no access from abutting property or streets.

It is expected that the center boulevard will be planted throughout its entire length with shrubs and trees, and banks and fills will be sodded. No effort is being spared to make the route attractive from the tourist's standpoint.

Lighting has been installed on a 25-mile section west of Toronto and it is hoped to extend this lighting over the whole distance. At the present time, incandescent lights of 300 watts are used at 150-foot intervals, with the lights for both lanes carried on a single pole. The wires for the lighting system are carried underground.

As in the case with other divided highways in Ontario, no building or power line may be erected within 600 feet of the right-of-way of the Queen Elizabeth Way without permission of the Department of Highways. Billboards, gasoline stations and places of business will not be permitted along this new route. It is hoped by regulation and education to restrict the Queen Elizabeth Way to motor vehicles only.

Some of the work on the Queen Elizabeth Way will be described in articles which will appear in subsequent issues of CONTRACTORS AND ENGINEERS MONTHLY.



The Littleford steam generator for tank car heating or cleaning equipment.

## Tank Car Heater

The Littleford steam generator for tank car heating, which is claimed to build up 200 pounds of steam pressure in less than two minutes' time, is designed for heating one or two cars at a time. It is light in weight, automatic and easy to trail, and will deliver either super-heated or saturated steam.

Another feature of this steam generator is its cleaning ability, as it can also be used to clean motors, machines, for stripping paint and for thawing culverts.

Further information on this trailer steam generator may be secured by interested contractors and state and county highway engineers direct from Littleford Bros., 485 E. Pearl St., Cincinnati, Ohio.

## A Scoop-End Truck Body With High Dumping Hoist

The Model 102 hoist offered by the St. Paul Hydraulic Hoist Co., Minneapolis, Minn., gives a 70-degree dumping angle with power applied to the hoist both in dumping and in returning the body to its traveling position. The use of a scoop-end body permits an increase in load with the same loading height as with conventional tail-gate bodies and eliminates the hardware which may be damaged in dumping. Complete information on these Hi-Dumpers will be found in Form 37-12 which will be sent free on request to those mentioning this item.


MAKE YOUR MAINTENANCE DOLLARS "TALK"

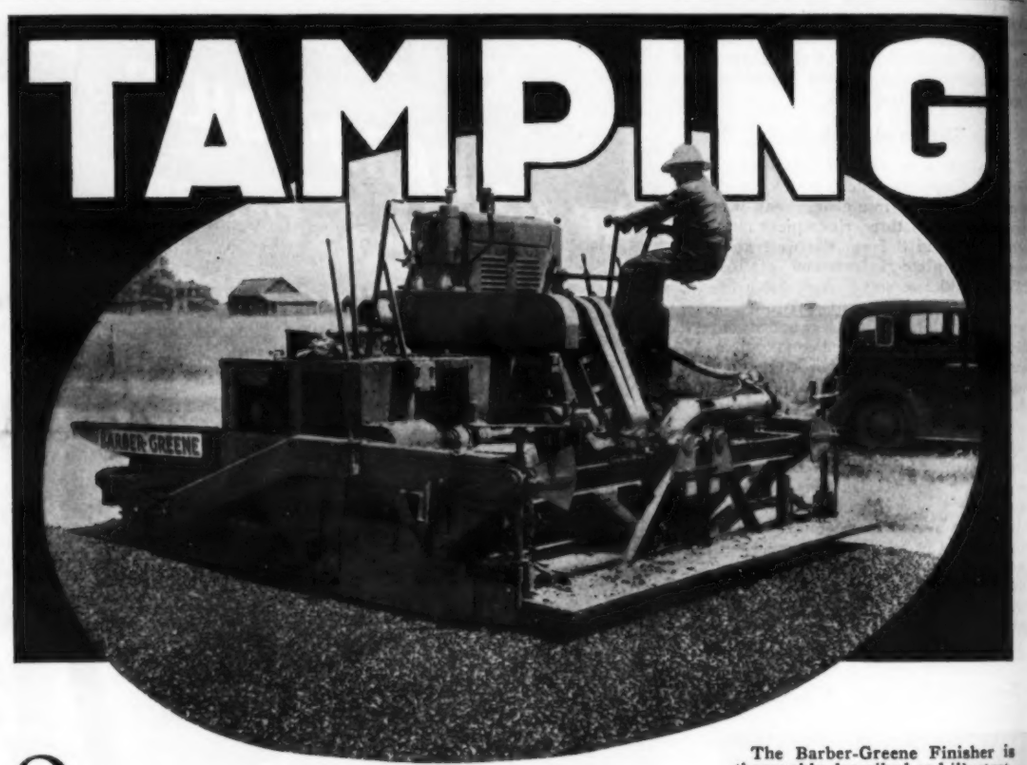
A BURCH UNDR-TRUK-MAINTAINER will cut your maintenance costs in half. Not only that, you will have smooth, even surfaced roads free from ruts and pit holes.

Can be attached to or taken off the truck you now own in five minutes, and does not tie it up from other work. Hydraulic controlled from cab or rear of machine.

THE BURCH CORPORATION
CRESTLINE, OHIO
*Manufacturers*
DUMP BODIES—HOISTS—CONVEYORS
STONE SPREADERS



TAMPING




ONLY the Barber-Greene Finisher *Tamps*. Only *Tamping* gives uniform compaction. Only uniform compaction assures a permanently smooth surface.

The ingenious and greatly superior Leveling Principle of the Barber-Greene would be practically worthless without *Tamping*.

The Barber-Greene *Tamps* and Levels simultaneously, automatically compacting more material into the depressions. *Even if forms are specified, Barber-Greene Tamping is essential, if the surface is to stay level under rolling and traffic.*

*Tamping* allows the Barber-Greene to lay stiffer, less workable mixes. *Tamping* kneads and compresses the material into place. *Tamping* not only compacts, but the vibration interlocks the fine particles. *Tamping* greatly reduces rolling, and eliminates local depressions that the roller bridges. *Tamping* simplifies matching joints, as both the old and the new mats are in their compacted states. *Tamping* is not just a theoretical advantage. Hundreds of miles of work throughout the country prove it—all Barber-Greene owners confirm it. We urge you to ask them. Barber-Greene Company, Aurora, Illinois.

The Barber-Greene Finisher is thoroughly described and illustrated in this new 36 page booklet. It comprehensively covers Principles, Accomplishments, and Important Features. You should add the interesting contents of this booklet to your present knowledge. Write for your copy, there is no obligation.

37-4

• STANDARDIZED MATERIAL HANDLING MACHINES •

Representatives in Principal Cities
BARBER GREENE
BRANCH OFFICES
Cleveland • Chicago • New York
Columbus • Boston • Detroit
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Standardized Belt Conveyors
CARRIERS
Portable CONVEYORS
SNOW LOADERS for high speed removal
Permanent CONVEYORS
and other standardized unit parts
MIXERS for Bituminous or Stabilized Mixing • • Central or Travel Plant
Leveling-Tamping FINISHERS
LOADERS for lowest cost loading
Vertical Boom DITCHERS
Low Cost-High Quality Road Construction

## Hall of Cleveland Dies

George H. Hall, Secretary and Sales Manager of the Cleveland Rock Drill Co., Cleveland, Ohio, and one of the founders of the company, died in Cleveland last month after a lingering illness.

In addition to his connection with the Cleveland Rock Drill Co., Mr. Hall was Treasurer of the Cleveland Pneumatic Tool Co. of Canada, Ltd., and a Director of the Cleveland Hardware Co. Russell R. Morgan, Treasurer of the Cleveland Rock Drill Co. and for 15 years its Assistant Secretary and Assistant Sales Manager, will handle Mr. Hall's work in the rock drill company.

## Contractors' Equipment

The 1940 line of C. H. & E. equipment for contractors, including portable saw rigs and attachments, woodworkers, single and double-diaphragm pumps for handling trash and sewage, self-priming centrifugals, triplex road pumps, centrifugal jetting and piston force pumps, single and double-drum reversible hoists, material elevators, mortar mixers, 3-ton tandem rollers, portable oil spray pumps, and accessories, is described and illustrated in the latest catalog issued by the C. H. & E. Mfg. Co., Milwaukee, Wis.

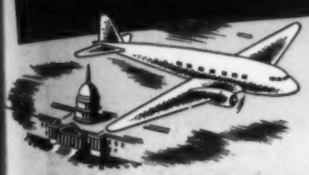
Copies of this catalog may be secured by interested state and county highway engineers as well as by contractors direct from the manufacturer by mentioning this item, or from CONTRACTORS AND ENGINEERS MONTHLY.

## Finishing Machines

A new catalog just issued by the Flexible Road Joint Machine Co., Warren, Ohio, tells us that if all the roads on which Flex-Plane finishing and joint-installing machines had been used were joined together, they would more than reach around the world at the equator. Other things which this catalog tells us include a description of the features of the Flex-Plane gas-electric finishing machine, with illustrations of these machines in service.

Copies of "Flex-Plane Around the World" may be secured by interested contractors and engineers direct from the manufacturer by mentioning this item.


Skyways OVER WASHINGTON



*. . . begin on the made ground of America's second-largest air terminal*

Eighteen million yards of hydraulic fill, two million yards of dry—and with park-like beauty the new Washington National Airport will have reared virtually all of its 710 acres above the surface of the Potomac River!

"Caterpillar" Diesel equipment, quite naturally, is playing a vital part in the creation of this great enterprise—just as its presence on any large construction project is usually taken as a matter of course. . . . For the speed, work-volume, operating economy and rugged dependability of "Caterpillar" Diesel Tractors and Motor Graders give the contractor advantages for profit he can scarcely hope to equal with less efficient or less sturdily built equipment.

CATERPILLAR TRACTOR CO., PEORIA, ILLINOIS

**DRY FILL**—"Caterpillar" Diesel D8 Tractors with LeTourneau Carryall scrapers excavating and hauling on Washington National Airport construction. Average load, 12 yds. Maximum haul, 1700 ft. Average trips, 6 per hour.

**LEVEE**—"Caterpillar" Diesel D7 Tractor with LaPlant-Choate bulldozer building earth levee on the new Washington National Airport project.

**ROAD**—"Caterpillar" Diesel No. 12 Motor Grader fine-grading road connecting with Mount Vernon Memorial Highway skirting new airport.

**WET FILL**—A fleet of "Caterpillar" Diesel D7 Tractors with LaPlant-Choate bulldozers leveling off wet fill for the Washington National Airport. Each uses about 2 gallons of 6½c fuel per hour working 22½ hours a day.

CATERPILLAR

TRACK-TYPE TRACTORS
ROAD MACHINERY • DIESEL
ENGINES and ELECTRIC SETS

*C. & E. M. Photo*

**Jahnig & Davis used a tractor and bulldozer to trim slopes, and moved the material from the ditch with a scraper.**

# Hitting the Grade With Scraper Outfit

(*Continued from page 1*)

for the cuts, fills and spoil. Backslopes ran from 2 to 1 in deep cuts down to 20 to 1. They were required to save the black topsoil in stockpiles for use in 6-inch layers on the slopes before seeding by the state maintenance crews. The ditches were all sodded by subcontract where the slope was more than 2 per cent, and all intercepting ditches were sodded. Some 800 cubic yards of gravel per mile of completed roadway was spread at the end to stabilize the surface.

In order to increase the load of the Carryalls in the relatively soft material worked in on this contract, the contractors had built up the front gate of the Carryalls about one foot by welding a plate across the top from side to side. This caused the material to pile up higher before spilling over, but when it did top the gate it would run over onto the front lower sheave and ruin the groove and cable. To prevent this, some heavy canvas and rubber panels were hung from the overhead frame so as to be between the load and the sheave. This proved successful in increasing the load without damaging the equipment. It was hinted that the increased yardage per day with the same hauling equipment paid for the operators' wages.

The Auto Patrol was used not only to finish the grade, after the Carryalls had spread the material and rolled it quite effectively, and for spreading the gravel but also, where the slopes were heavy material and very well packed, the Patrol dropped its scarifier and loosened the material on the trip one way and bladed the grade on the return trip. The bulldozer was used to trim a slope that was partly cut by the Carryalls but which developed "sugar sand" troubles, making it too soft for the heavy scrapers. The bulldozer ran from the top down and trimmed the slope to the desired section. When it had accumulated more material at the bottom of the ditch than the available scrapers could readily handle, the bulldozer moved it to the grade which was being raised.

About ½ mile from the north or Lynd end of the job there was a fill 53 feet high, involving about 46,000 yards of material in a very short distance and with exceedingly steep slopes on the banks from which the material was being cut. A 4 x 4-foot concrete box culvert 204 feet long was built at the bottom of this fill. Then it was up to someone to make the first trip with a Carryall down the steep slope. Bill Doyen, familiarly known as "Scrap Iron" and one of their best "Cat skinners" and scraper operators, was selected for the job. He started down and began to travel fast but, with the calmness that bespeaks the experienced operator, he dropped the pan deeper and deeper into the dirt, the load piled up and the cutting edge of

(*Concluded on next page*)

## J. B. Templeton Elected Templeton, Kenly President

Announcement has been made of the election of J. B. Templeton, formerly Vice President of Templeton, Kenly & Co., Chicago, manufacturer of Simplex jacks and equipment, as President of that organization, succeeding W. B. Templeton who is now Chairman of the Board of Directors.

J. B. Templeton has been associated with the company since 1928, at which time he started in the company's shops to learn the business from the ground up. Subsequently he entered the sales department, working in various sections of the country and eventually becoming manager of the New York office. In 1935, in order that W. B. Templeton, founder of the firm in 1899, might spend more time in the foreign field, the younger Mr. Templeton assumed the duties of Vice President and Sales Manager.


7

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3. Pull Shovel
4. Dragline
5. Magnet
6. Clam
7. Pile Driver

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Waterloo Road, Cleveland, Ohio

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(*Below*) **WHEEL BEARINGS** and scraper sheaves on this Le Tourneau Scraper are also protected with Marfak. A valuable tip to contractors!

## reports Northwestern Engineering Company

THIS CONTRACTOR had to build a road through a pass 10,000 feet above sea level, out near Dubois, Wyo. Here a tough job was made much tougher by springs and seepage that kept all his equipment working in mud.

To provide a dependable safeguard against time-eating delays and costly mechanical failures he turned to Texaco. Starting with his dragline, every piece of equipment on the job was lubricated with the proper Texaco lubricant.

Today—4 years later, Northwestern Engineering Company's job superintendent says of this Texaco fueled and lubricated job—"excellent results."

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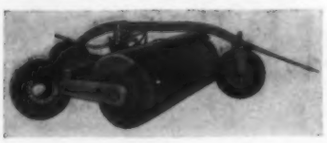

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*C. & E. M. Photo*
**Cutting backslope with a 13-yard Carryall scraper.**

# Short-Cuts Speed Minn. Grading Job

*(Continued from preceding page)*

the scraper acted as a most effective brake to prevent a runaway. To get the outfit uphill again required the services of a booster. But the cuts were so deep and the material was moved so rapidly that the booster had to work for less than an hour with the three Carryalls.

One long side-hill cut near the north end of the job ran into a 35-foot fill.

### The Magic Culvert

Here we have the marvel of the job—a 362-foot concrete pipe 30 inches in diameter with a fall of 17 feet from end to end and with 40 feet of fill over it. Fearing that the fill might crush the pipe, the contractor was particularly careful in setting it. The bottom of the section was muck, so this was bulldozed out and backfilled with 5 feet of sand and a little clay to stabilize it. Then the pipe was set 18 inches into this backfill, the material well tamped around the pipe and the fill completed.

But where is that marvel we were talking about? Here it is! When completed, there was no water at the upper end of the culvert yet at the downstream end a considerable flow of water was issuing from the pipe. How come? Thereby hangs the mystery. When they were excavating that muck, they discovered a fine healthy spring and since it was plumb in the middle of the right-of-way it was necessary to do something about it. A 6-inch terra cotta tile drain was laid from the spring to the culvert pipe, a break made in the concrete pipe and the drain cemented in.

### History of Jahnig & Davis

A couple of real "he men" who can handle any of their own equipment as well as the men working for them, and who have never had a written agreement between them in the 20 years they have been in partnership—that is the story of Jahnig & Davis in a nutshell. Their first job, one they admit that they could not land now under similar circumstances, what with prequalification, etc., was the biggest dirt job ever let in the state of South Dakota. It was east of Britton, 24 miles long, was bid in at $215,000 and took two years to complete. They used an elevating grader pulled by an Avery gas tractor and horse-drawn dump wagons.

In the winter of 1921 they went to the A. R. B. A. Road Show at Chicago and marveled at the big 10-ton Holt tractor exhibited there. The second day of the show there was a big sign on the tractor reading "Sold to Jahnig & Davis, Britton, S.D." and immediately after the Show it was shipped to their next job.

Since this partnership is conservative and bids only on jobs it really wants and not just to keep going, they state emphatically that they have never lost money on any job they have run. All honor to that kind of a contracting outfit; they deserve great credit. Also remember that they do not run on a cost-plus basis but always on lump-sum bidding, the customary method in the highway field.

*C. & E. M. Photo*
**Partners for twenty years—W. M. Jahnig (at left), and L. M. Davis.**

On the Lynd to Russell grading job described, R. A. Gilbertson was Project Engineer for the Minnesota Highway Department.


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**Now the same revolutionary 2-cycle Diesel Power ... the same money-saving extra advantages ... that made the Allis-Chalmers HD-14 such an instant success are available to you in two new sizes—the HD-10 (71 drawbar h.p.) and HD-7 (54 drawbar h.p.). Select the tractor required by your power needs. No matter what your choice, you have a quick-starting, responsive, smooth-running Diesel tractor ... built to assure you profits, even on low bids and tough jobs. You have a powerful 2-cycle full Diesel engine, proved by thousands of dirt moving hours ... in mud, sand and rock ... in blistering heat and subzero temperatures. You gain a big profit-making margin with Allis-Chalmers exclusive features—the Positive-Seal truck wheel assembly that requires lubrication only once in 200 hours ... "Long-Wear" bi-metallic clutches and brakes that outlast ordinary clutches and brakes several times over ... a new track release spring that materially lengthens track life.**

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**All three Allis-Chalmers Diesel tractors have the cleanest decks and most comfortable tractor seats you've ever sat in. Their powerful 2-cycle engines really get down and hang on—no more see-sawing on steering levers to get your load in tough going. You have a lightning pick-up that keeps loads rolling at a fast clip ... that cuts out plenty of gear shifting ... that reduces arm weariness. Try it!**

# Piling Neatly Handled On Open-Cut Sewer Job

(*Continued from page 2*)

for the sewer in this section as it rests on hardpan.

The wood sheeting is 3 x 8-inch tongue and groove in 16-foot lengths and used with 8 x 8-inch rangers and braces. Because of the soft ground that caved with the wood piling in one section, the sheet piling was extended about 60 feet.

A novel and easy method of handling the steel sheet piling and insuring a straight line of piling with the minimum loss of time was developed and used on this job. With some of the steel sheet piling already driven, the contractor mounted a pair of 16 x 16-inch timbers across the sheeting and then two running longitudinally. On the two latter timbers he is able to carry a large bundle of the piling laid across the trench. With the piling located at one spot the crane operator easily got the swing of the method and the piles are placed ahead and threaded quickly. This is far better than dumping a lot of loose piles along the right-of-way and expecting the crane operator to pick them all up with equal speed. In addition, the two 16 x 16-inch timbers running longitudinally act as guides for the placing of the piles and keep the line straight.

A P & H crane mounted on a 10-wheel Sterling truck unloads the steel sheet piling from the freight cars and performs innumerable other odd jobs throughout the work. It was tested by the contractor and easily handles an 8-ton load at a reasonable radius.

### Personnel

Section 105 is being handled in a smooth manner by the V. Barletta Co. of Boston, Mass., under the personal direction of V. Barletta, and with Nicholas Barletta as Superintendent. L. F. Davies is in charge of the compressed-air operations. For the Sewerage Division, Metropolitan District Commission, Joseph P. Dever, Chief Engineer, Joseph F. Whalen is Resident Engineer.

## "The Bends" Are Hard On Men or Wire Rope

A diver or tunnel-worker who has had a serious case of "the bends" is a man marked for a short and restricted life. A wire rope that has encountered a bending condition that was too much for it is also doomed to a shorter and less useful life. Continual bending and rebending takes a lot out of metal—but it is much less harmful if the metal has been prepared to resist its fatiguing effects. Helium gas is an aid to the diver in preventing "the bends," and likewise preforming gives longer lease of life to the wire rope that is subjected to severe bending.

Many years ago, when preforming was first introduced into wire rope manufacture, one of the most desirable qualities noticed in the preformed rope was its ability to withstand the effects of bending better than non-preformed ropes. A little study soon gave the reason for these improved bending qualities.

When a wire rope is made by the old conventional method, each wire is put in a condition of stress as it is closed into the rope. The entire rope structure is one in which many stresses are bound up. When this rope is bent over a sheave or a drum, it is subjected to additional stress. This double stressing of each wire brings on a metallic fatigue in the wire at an earlier date than if the rope had to contend only with pure bending stresses.

In preformed wire rope, the preforming operation removes stresses that are built up when the wires are combined into strands, and also prevents any later stresses from forming when the strands are closed into the rope.

Thus, the preformed rope is a structure free of stress, with all its wires in a "state of ease." When this rope is bent over a sheave or drum, it has to contend with pure bending stresses only. No other unseen forces are added, except of course the force caused by the load itself. Hence, preformed rope is less affected by bending. That's why it lasts longer.

## Placing Concrete By Pump

A new catalog describing and illustrating the various models of Pumpcrete, the pump that pumps concrete, has recently been issued by the Chain Belt Co., 1666 W. Bruce St., Milwaukee, Wis. In addition to giving the specifications for the Rex 160 single and double Pumpcrete units, the Model 180 single unit, and the Rex 200 single and double Pumpcretes, this new 24-page catalog contains a large number of job photos showing concrete being placed by Pumpcrete on bridge jobs, tunnels, overpasses and underpasses, locks, dams and hydro-electric projects, marine work, sewage treatment plants and water works, and unusual concrete-placing jobs.

Copies of this Bulletin No. 366 may be secured by interested contractors and engineers direct from the manufacturer or from this magazine.


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**LOOK AT THE RECORD** of the 6-ELH Waukesha-Hesselman Oil Engine in this Lorain-87 clamshell purchased new in Jan. 1937 by the Thomas Henry Material Co., Union City, N.J. Equipped with 60-ft. boom it is on the job every day unloading barges of building material and charging into loading bins on the docks . . . **READ THE LETTER**

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This crane was purchased new in January, 1937 and had 13,000 hours of operation to its credit on September 4th, 1939. We did a valve and carbon job on it at that time and found only a very slight wear in the sleeves in the ring travel and the original pistons are still in use although a new set of rings were installed at this time. Our total service cost during this entire period was $100.00.

We attribute this partially to the manner in which we take care of our equipment and use only the best we can obtain in fuel and lubricating oils. Should occasion require we will again specify this power in our equipment.

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This calcium-chloride-stabilized approach road to the Thousand Islands Bridge carried 185,000 vehicles during the year following the bridge's completion.

# Approaches to Bridge Test Stabilized Base

**Total of 185,000 Vehicles Have Passed Over Calcium-Chloride-Stabilized Road Leading to Thousand Islands Bridge**

✦ THE Thousand Islands Bridge, newest of the spans between the United States and Canada, which was dedicated in a ceremony in which President Roosevelt and Canadian Prime Minister McKenzie King participated, has now been open well over a year. In the one-year period from the time the ceremonial cord was cut on August 18, 1938, until August 18, 1939, a total of 185,000 vehicles passed over the bridge and traveled the 4.34 miles of roadway which serves as an approach and connecting link between the American and Canadian spans.

Constructed with run-of-bank gravel, the roadway was laid 20 feet wide and treated with calcium chloride at a rate of approximately 1½ pounds per square yard. According to Roy F. Hall, District Engineer of the New York Department of Public Works, Watertown, N.Y., this road carried more than 8,000 cars on the day the bridge was opened.

### Value of Stage Construction

"This traffic did an excellent job of rolling and compacting the surface," Mr. Hall reports. Later in 1938 some loam and limestone screenings plus about ¼ to ½ pound of calcium chloride per square yard was added. From then until freezing, the road was honed regularly, and during the winter it was plowed and sanded.

During 1939 several light applications of calcium chloride were made, beginning about June 1 and extending through July. The total amount of calcium chloride applied in 1939 was less than 2 pounds per square yard.

"This type of stage construction has served to compact the roadway and take care of settlement of fills," Mr. Hall reports. "There is no doubt in our minds that the road when paved will be better for the packing and pounding it has received from 185,000 cars.

"The calcium chloride kept the dust down and kept the roadway moist for compaction. We are agreeably surprised at the amount of traffic this type of road has been able to handle at very low cost."

*Want information on equipment? Write the Editor.*

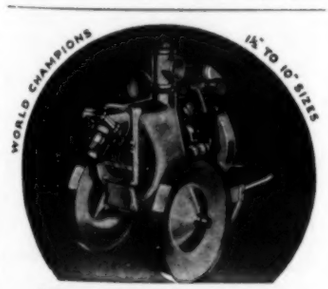
## A Heavy-Duty Shovel Of 2 1/2-Yard Capacity

The new Type 392 Marion power shovel is a 2½-yard machine powered either with a 6-cylinder Hesselman, or a 6-cylinder Buda diesel engine. It is convertible for dragline, clamshell and crane service. The operating machinery is mounted on an upper frame consisting of a strong multiple-webbed base. Arranged for maximum accessibility and positive alignment, the operating machinery is mounted on anti-friction bearings to insure speed and ease of operation.

The Marion lower frame consists of three major units—the frame casting which carries the axle, traveling mechanism and rotating gear, and the two cast steel side frames. The live roller circle is built to give an even distribution of the load, and the crawlers are wide and long to provide maximum stability for the machine in operation. The crawlers are self-cleaning, guaranteed not to clog in any material nor bind when moving over uneven surfaces. They are equipped with manganese steel pads.

The new Marion Type 392.

Bulletin No. 384 issued by the Marion Steam Shovel Co., Marion, Ohio, describes the Type 392 in detail and gives specifications and the working range of the shovel as well as with the dragline and crane booms. Copies of this bulletin will be sent free on request by the manufacturer to those mentioning this item.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# Preparing Batches For Boulevard Job

(*Continued from page 1*)

and 1½-yard Owen clamshell, with two men in the cars to clean up. The material was loaded directly into the batchers which were lined up so that the trucks could run through and then turn around in a large open space beyond and return for the cement.

Four Johnson weighing batchers were placed first in line for the two sizes of stone and arranged so that there were two for coarse and two for fine gravel, dumping at the same time into the two compartments of the trucks. A short move ahead to the Blaw-Knox batchers where the sand was weighed completed the loading of the aggregates. The sand batchers required a second move to drop the sand into the second batch because of the parallel dumping of the plant as set up. The placing of the batchers in line, with the chance for the trucks to drive through, made for fast batching and hence a reduction in the number of trucks required for the job. This ran from a minimum of five to a maximum of eight, all hired and equipped with dual pneumatic tires.

The batches totaled 4,815 pounds with water included. The weights at the time the job was visited were: 1,270 pounds of 2½ to 1-inch gravel, 1,281 pounds of 1½ to ¼-inch gravel, 1,370 pounds of sand, and 7 bags of cement. The cement was furnished by the Peerless Cement Corp. of Detroit and hauled a distance of about 23 miles on heavy trucks and trailers with 600 bags per load, making about 30 tons, by the Alger Trucking Co. of Detroit. The cement was unloaded onto the batch trucks directly from the trailers. Four of the contractor's men were on the trailer, or truck, and two stepped onto the batch truck while the other two passed the bags to them for emptying. The wires were cut during the waits for the trucks to arrive for their loads. The empty bags were tossed onto the road and one man picked them up, shook them and baled the bags for return. At the batchers one man handled the four gravel batchers and one other man the sand batchers without any undue rush and no delays in serving the trucks.

### Pouring the Concrete

The batch trucks entered the subgrade on which the paver traveled at any convenient place and backed to the skip where the batches were dumped and the bodies thoroughly cleaned by the dump man. The Ransome paver pulled a trail-grader consisting of a portion of an R-B Finegrader without the cutter bars working. One man at each side of the trail-grader shoveled out the excess earth, and with the odd job man also handled the hose when required. In addition, they assisted in handing in the bar mats to the puddlers.

After a full one-minute mix in the paver, the concrete was delivered to the subgrade where the three puddlers inside the forms placed it. The two outside puddlers spaded against the forms and also shoveled any excess away from the strike-off of the finishing machine. A 1½-inch slump concrete was used. The strike-off for placing the bar mats 3 inches below the top of the concrete was pulled forward by the winch on the paver.

*C. & E. M. Photo*
**Batchers well-arranged for fast loading of trucks on the R. D. Baker Co. concrete paving contract at Birmingham, Mich.**

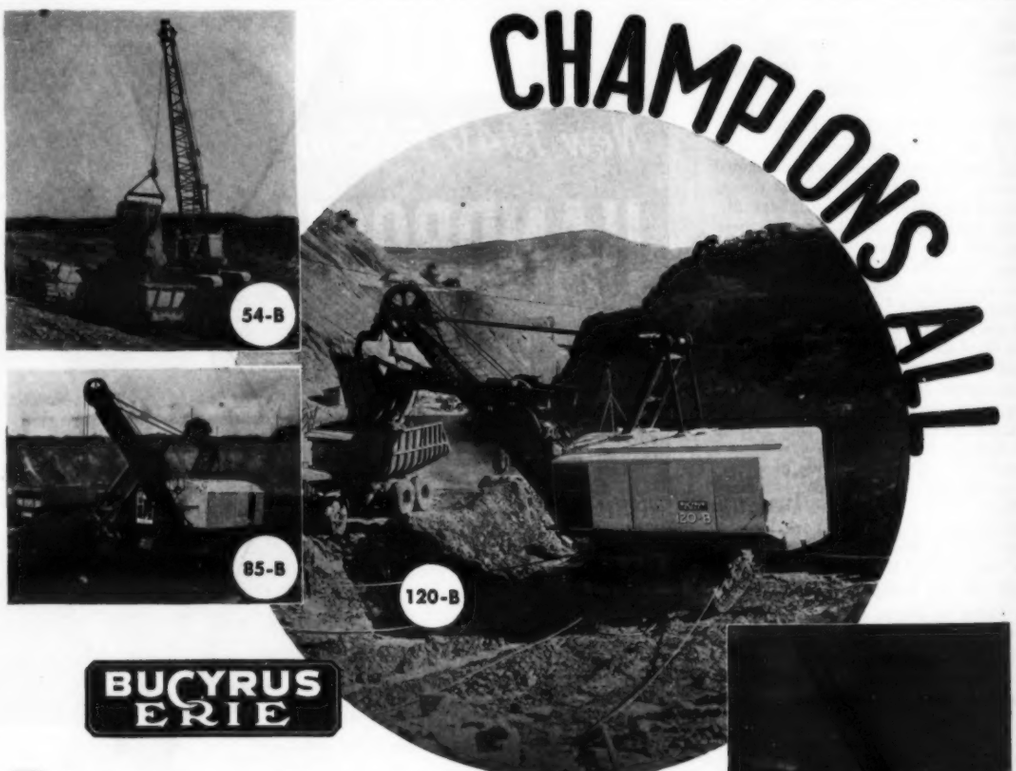
### Reinforcing and Expansion Joints

The bar mats placed 3 inches below the top of the concrete consisted of four deformed ⅜-inch bars longitudinally, spaced 6 inches at each side, with seven ¼-inch bars spaced across the center section. The transverse steel bars were ¼-inch deformed bars spaced 12 inches. The mats, which were clipped, measured 12½ x 10 feet. Just before the placing of the bar mats, the puddlers dropped the ½-inch x 4-foot tie dowels at 40-inch spacing across the center plane of weakness that was created by the special machine behind the finisher. These tie bars and the side tie bars were carried on the ends of the trail-grader for convenient handling by the puddlers who placed them.

The side tie bars were bent at right angles and inserted in wooden keyway forms slotted to receive them, one of the legs extending into the concrete and the other into the keyway so that it would be bent out when the next slab or adjacent curb was being poured. These bars also were spaced at 40-inch intervals.

The expansion joints were spaced 120 feet apart, with three dummy joints at 30-foot intervals between. The reinforcing for the middle dummy joint con-

(*Concluded on next page*)


FROM these five world-famous Bucyrus-Erie heavy-duty excavators, you can select the machine best suited for your big output jobs. The 2½-yard 54-B, the 3¼-yard 85-B, the 4-yard 100-B, the 5-yard 120-B and the 6-yard 170-B—are all "years ahead" champions springing from a long line of outstanding ancestors. Since 1880 Bucyrus-Erie has been accumulating the experience that has gone into making today's Bucyrus-Erie quarry and mine type machines the best heavy duty digging tools that can be built. Field service on all kinds of jobs, all over the world, has proved their capacity for big output in tough digging, for ability to give continuous low-cost service with a minimum of maintenance worry. This line of excavators leads in sales around the world because each machine has the engineering of tomorrow — for your jobs today.

Bucyrus-Erie
SOUTH MILWAUKEE, WISCONSIN

Carey Elastite EXPANSION JOINT
Standard in Concrete Construction for 25 Years
ECONOMICAL and EFFICIENT
Asphalt Joint · Rubber Joint
Non-Extruding Expansion Joint
Plate Dowel Expansion Joint
Sub-grade Felt
THE PHILIP CAREY COMPANY
Dependable Products Since 1873
LOCKLAND, CINCINNATI, OHIO

# Double 22-Foot Slabs On Mich. Paving Job

(Continued from preceding page)

sisted of a "ladder" assembly of 15 x ¾-inch dowels spaced 15 inches on centers tied to two ½-inch round deformed bars 21 feet 11 inches long. This was placed immediately below the bar mats which were cut at the reinforced middle joint, but carried through the other two dummy joints. The ladder dowels were painted with a bituminous material to permit them to slide within the concrete but to hold the slabs in true line both vertically and horizontally.

The expansion joints consisted of 1-inch thick premoulded material 11 feet long and cut to fit the parabolic contour of the subgrade and the surface, but from ¼ to ½ inch lower than the top of the pavement. They were set without a steel plate as their thickness made them sufficiently rigid. A double cap lapping down 1 inch on both sides ran the entire length of the joint material. The dowels for the expansion joints were supported by baskets equipped with base plates. The dowels pierced the premoulded material and were capped on one end. Each of the two 11-foot lengths of premoulded expansion-joint material was held by four heavy pins driven into the subgrade.

In organizing this job the contractor had the bar mats set out ahead of the paver on one side of the slab and the expansion joints and the dummy joint ladders on the other shoulder.

### Finishing

The first finishing was with an Ord double-screed finisher which carried the cutting wheel for the center strip. Then the two hand finishers used a 10-foot drag and checking straight-edge. For building up low spots after extra concrete had been spread over the place a pair of 10-foot channel aluminum floats with long handles were used effectively. The Lakewood checking straight-edges were then used again to be sure of the smoothness of the surface. These men did no work behind the center-joint machine.

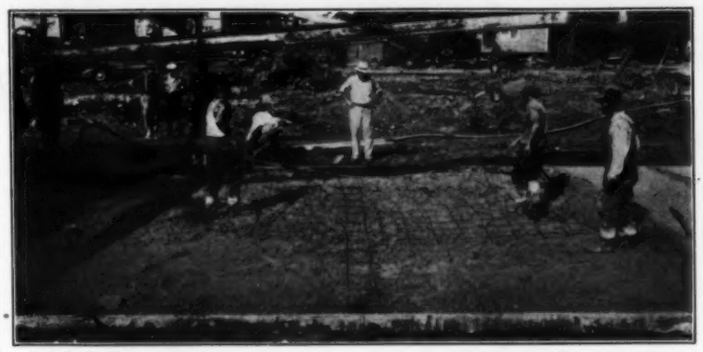
### Center Strip and Dummy Joints

After the first checking of the pavement the Cleft Plane center-joint machine was pushed along by the operator and a helper, inserting the center strip at a depth of 2½ inches and floating over the top. Premoulded material was used in 5-foot strips. The helper and two joint men edged both sides of the pavement and the expansion joints. The two edgers cut the dummy joints at intervals of 30 feet and inserted the premoulded material of the same dimensions as the center strip. The cut for the dummy joints was made with a T-iron with a pair of plow handles for easy handling. Behind the Cleft Plane machine a drag of burlap attached to the machine gave a sand finish to the surface which is all that was done for skid-proofing the pavement.

### Curing

The curing of the pavement was handled quickly and effectively by spraying the surface behind the last finisher, after the water had disappeared from the surface, with an asphalt emulsion, taking care that the surface was completely covered with the asphalt but not too heavily so as to cause skidding after the pavement was placed in service. The emulsion was sprayed with a pressure pump direct from the drums carried on a small wheeled frame.

This method not only sealed the water in the slab, preventing evaporation, but also reduced the amount of water that had to be pumped by the Barnes triplex pump which alone supplied the paver on this job. It was located on the bank of a small stream which was dammed with sand bags to furnish a pond for easy pumping. Another saving of this method was a reduction in the number of men employed, as with sprinkling of earth cover or ponding more men are required for the operation. As soon as the forms were stripped, the asphalt-emulsion spray outfit was taken back and the edges of the slab were sprayed.



*C. & E. M. Photo*

**Placing the bar mat over the steel at a contraction joint.**

### Personnel

On this boulevard contract Carl Krueger was Superintendent for the contractor, The R. D. Baker Co. of Royal Oak, Mich., and E. C. David was Project Engineer for the Michigan State Highway Department.

*Is your equipment obsolete? Read the announcements of the many new pieces of equipment, which will save you time and money, in this issue and write for further information.*


*Be sure it's the*

**GIANTGRIP STRAIGHTEDGE**

Either Steel or Aluminum

*For Checking Concrete Surface*

Two useable edges:—one sharp-cornered and squared for scraping; the other rounded for line-point straightedging.

*ASK YOUR DEALER*

L & M Manufacturing Co.
(Division of Moodie Forge Co.)
18302 BEREA RD., CLEVELAND, OHIO

THEY'VE PUT ALL JOBS
on a "Dirt-Time-and-Cost" Basis
With Rooters reducing all materials save solid rock into the LeTourneau 'Dozer-Carryall Scraper excavation class . . . by providing perfect fragmentation for as little as *one-third* the cost of blasting . . . the majority of today's contracts awarded are being won on this "dirt-time-and-cost" basis.
. . . And, with LeTourneau Carryall Scrapers *preserving* lowest-cost-per-yard excavation *and placement* over the longer hauls . . . contractors have been alert to the added advantage of LeTourneau 'Dozing, to complete their earthmoving package—and extend the savings over *all* jobs.
. . . But, convince yourself! A demonstration of LeTourneau's constantly advanced design, construction and operating features shows you how these tools will give you the "edge" in *today's* bidding . . . and will *keep* you in business *tomorrow!* Ask your LeTourneau and "Caterpillar" dealer, or write R. G. LeTOURNEAU, INC., Peoria, Ill., Stockton, Calif.
The only way you can bid LeTourneau prices...and make a profit...is to use
LETOURNEAU
CARRYALLS* 'DOZERS ROOTERS*
POWER CONTROL UNITS, DRAG SCRAPERS, PUSHDOZERS, SHEEP'S FOOT ROLLERS, CRANES, TREEDOZERS
*Name Reg. U. S. Pat. Off.

The new Adams No. 411 diesel-powered motor grader.

## New Motor Graders Announced by Adams

Two new motor graders of the engine-over-drive type have recently been announced by the J. D. Adams Co., Indianapolis, Ind. The larger of these machines, known as the No. 411, is powered by a 62½-hp diesel engine and is a heavy-duty unit. The smaller, No. 303, is powered by a 45-hp gasoline engine. Both machines are identical in design.

These new graders are built around the all-welded box-type main frame developed by Adams several years ago and which is characteristic of all Adams units. Features claimed for this type of frame are strength and rigidity, unhampered visibility of the blade for the operator, and a wide range of blade positions.

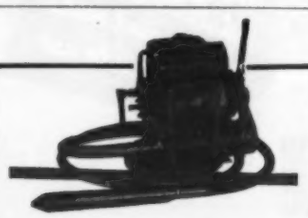
With the same setting of the lift linkage, and with the blade in center position, the blade can be adjusted from deep ditching position to high bank-cutting position in about 40 seconds, with all adjustments made by the operator without his leaving his seat. The circle is full-revolving and the blade can be set to ditch or move dirt with the machine operating in reverse gear. Both machines have eight forward speeds and two reverse. The wide range of blade adjustments in all directions, tandem drive with low-pressure tires and leaning front wheels permit these graders to be used on all types of surface, ditch and bank work.

Two new catalogs, describing and illustrating the Adams No. 411 and the 303 graders, may be secured direct from the manufacturer.

## Steffey Made President Of Prismo Safety Corp.

Charles E. Steffey, formerly with the National Cash Register Co., has been appointed President and General Manager of the Prismo Safety Corp., Huntingdon, Pa. Gilbert Rodli will continue as Vice President and assist Mr. Steffey in carrying out an aggressive sales campaign, which is soon to be announced.

During the 16 years that Mr. Steffey was Vice President, Director and General Sales Manager of National Cash Register, this organization knew its period of most rapid expansion and largest sales volumes and profits. Mr. Steffey became interested in and has watched the development of Prismo for more than a year and has made a very thorough survey and study of the application and possibilities of Prismo products for highway safety.

Concrete VIBRATORS
AND GRINDERS
Write for Circular on types, sizes and prices
White Mfg. Co.
ELKHART INDIANA


## New District Sales Managers For Williams Bucket Division

The Williams Bucket Division of the Wellman Engineering Co., Cleveland, Ohio, has announced the appointment of John E. Carlson and A. Winkler Prins as District Sales Managers for Williams buckets.

Prins, who was formerly with the sales department of Hubbard & Floyd, New York, distributor of contractors' equipment, will be located at 30 Church St., New York City in which territory he is well known.

Carlson will maintain offices in the Equipment Division of the Great Lakes Supply Corp. at 324 W. 36th St., Chicago, Ill., distributor of Williams clamshell and dragline buckets in the Chicago area. For many years Carlson was associated with W. J. Newman Co., working on construction jobs in and around Chicago, and his practical field experience will be helpful to contractors in their excavating and material-handling problems.


What's NEW in Pile Driving Equipment?—

SEE *NEW* UNION BULLETIN No. 184, just out!

Whatever your requirements, UNION's complete series of sizes will contain just the hammer to meet them. Several new sizes have been added, and if you need a GIANT size to do a GIANT's job of driving the heaviest kind of piling, just look for it in this *new* catalog.

*Shall we send you a copy?*

UNION IRON WORKS, INC.
P.O. BOX 18, ELIZABETH, N.J.

# "Ay, Mon, She's Braw an' Thr-r-ifty, Too!"

I am at breakfast, when there is a bold step on the porch and a knock at the door. I open it and there is none other than my Scotch friend, Donald MacMurdoch.

"Oliver," he says, stamping his feet, "I've gone and done it!"

"Done what, Donald?"

"Why, mon, I've pur-r-rchased m'sel a new truck," he said with a burr so thick it stuck on his tongue. And not bein' able to resist pullin' his leg a little, I come back at him.

"Are you feelin' all right, Donald," I asks. "You wouldn't be spendin' good money for a new truck when the old one could carry all the laundry in town, would you?"

"But it's a For-r-rd," said Donald, as though that explained everything. "Throw on your sheepskin and take a look."

So I did, and we went outside, with Mamma yellin' at me to button up my coat.

It was a big panel job, painted a fire-engine red, with "Heatherglo Laundry, Donald MacMurdoch, Prop." painted on the side.

"Why didn't you get a red one, Donald?" I ask him.

"It is r-r-red," he answered.

I looked her over from trim front end to rear, and I must admit she is a beauty. I told him so.

"Ay, mon, she's braw an' thr-r-ifty, too," and he looked for all the world like a new father.

"I figur-r-red it oot," he went on. "You canna save money when you're pour-r-ring pr-r-rofits back into repair-r-rs. And you canna get new customer-r-rs with a shabby auld go-cart like the aither truck was. Mon, I'm oot for business, and this truck will tur-r-rn the trick!"

We got inside then and toured around a couple of blocks, and the neighbors that was out all turned to watch us pass.

"Solid comfor-r-rt," said Donald. "And she purr-r-rs like pussy."

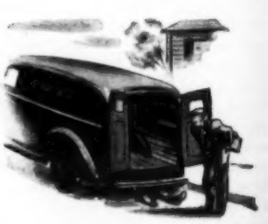
"How many miles to a gallon? I ask.

"Good enough to suit a Scot," said Donald, "and not a drop of oil has she used!"

We got back to the house, and Donald showed me the door checks, and how they'd put tongue-and-groove planks on the floor to seal it up tight.

"Take a look under-r-rneath, Oliver," Donald said, and bein' a man who is interested in mechanics, I flattened out and scootched under. As clean an underside as ever I saw, with rugged-lookin' driveshaft and springs and a husky axle housin'.

"They know how to build trucks at Ford's, that's one thing sure," I said, crawlin' out.



And then I noticed that my shirt was streaked with dirt, where I'd been on the ground, and Donald sees it, too.

"A shame," he says. And then he gets thoughtful.

"My own fault," I says. "If I'd buttoned my coat like Mamma said, it'd never have happened."

"We-e-el, Oliver," Donald says. "Strip it off and let me take it along. It'll only cost you fifteen cents finished up like new."

"You're right about that truck," I says. "It's gettin' you business already."

"Of cour-r-rse," said Donald. "That fifteen cents is the rate with 10 pounds of rough dry. It ought to be seventeen cents. But seein' thot you're a friend of mine . . ."

Well, what could I do?

*Visit the new Ford Expositions at the two Fairs, New York and San Francisco, 1940*

FORD V-8 TRUCKS AND COMMERCIAL CARS

*Ford Motor Company, Builders of Ford V-8 and Mercury Cars, Ford Trucks, Commercial Cars, Station Wagons, Transit Buses*

## A.R.B.A. Officers For Coming Year

The following new officers for the American Road Builders' Association and its various divisions were elected at the Annual Convention held in Chicago and will take office at the Annual Meeting of the Association to be held in Washington next month:

President, H. G. Sours, Assistant Director and Chief Engineer, Ohio State Highway Department; Vice President, Northeastern District, Paul B. Reinhold, Secretary-Treasurer, Reinhold & Co., Inc., Pittsburgh, Penna.; Vice President, Southern District, John E. Ballenger, President, Ballenger Construction Co., Lakeland, Fla.; Vice President, Central District, Lion Gardiner, Vice President, Jaeger Machine Co., Columbus, Ohio; Vice President, Western District, Stanley Abel, Supervisor, Fourth District, Kern County, Taft, Calif.; Treasurer, H. C. Whitehurst, Director of Highways, District of Columbia; Directors, R. L. Baldock, State Highway Engineer, Salem, Ore.; Robert B. Brooks, Consulting Engineer, St. Louis, Mo.; J. F. Cast, Manufacturers' Sales Manager, Firestone Tire & Rubber Co., Akron, Ohio; Paul L. Griffiths, Vice President, Koppers Co., Pittsburgh, Penna.; A. E. O'Brien, Secretary, Associated Pennsylvania Constructors, Harrisburg, Penna.; M. P. O'Connor, J. C. O'Connor & Sons, Fort Wayne, Ind.; and J. E. Pennybacker, Managing Director, The Asphalt Institute, New York City.

The new officers for the Highway Contractors' Division for the year 1940-41 are as follows: President, Herbert R. Anderson, President, Robert R. Anderson Co., Chicago, Ill.; Vice President, William R. Smith, President, Lane Construction Co., Meriden, Conn.; Directors, C. A. Switzer, Arvada, Colo.; Julius Porath, Julius Porath & Sons, Detroit, Mich.; S. B. Brinson, Ebersbach Construction Co., Tampa, Fla.; James J. Skelly, President, James J. Skelly Co., Media, Penna.; Alex Hancock, President, Alex Hancock Construction Co., Mobile, Ala.; H. B. Roberts, President, Roberts Paving Co., Salisbury, Md.; A. G. Rolfe, President, McGuire & Rolfe, Inc., Washington, D. C.; and Robert P. Bayard, Johnson, Drake & Piper, Inc., Freeport, N. Y. Directors at large for one year include H. M. Birtley, Secretary, Florida Section, A.R.B.A., Tallahassee, Fla.; E. W. Moeller, Executive Secretary, Minnesota Highway Development Association, Minneapolis, Minn.; Nello Teer, Durham, N. C.; Otto A. Milburn, Rockford Construction Co., Rockford, Ill.; M. G. Cobb, Cobb Brothers Construction Co., Inc., Meridian, Miss.; Milton Rue, Rue Construction Co., Bismarck, N. D.; and Taylor G. Soper, Executive Secretary, Illinois Road Builders' Association, Chicago, Ill.

For the County Highway Officials' Division, the new officers are: President, Leon V. Belknap, Engineer-Manager, Oakland County Road Commission, Pontiac, Mich.; Vice President, Northeastern District, R. B. Traver, County Superintendent of Highways, Onondaga County, Syracuse, N. Y.; Vice President, Southern District, W. O. Washington, Consulting County Planning Engineer, Brownsville, Texas; Vice President, Central District, Alan N. Buck, County Superintendent of Highways, Macon County, Decatur, Ill.; Vice President, Western District, Arnold M. Baldwin, County Surveyor, Santa Cruz County, Santa Cruz, Calif. The Directors are J. A. Bromley, County Roads Engineer, Anne Arundel County, Annapolis, Md.; L. P. M. Gaylord, County Superintendent of Highways, Lewis County, Lowville, N. Y.; O. S. Hess, Engineer-Manager, Kent County Road Commission, Grand Rapids, Mich.; John A. Kelley, Consulting Engineer, Michigan City, Ind.; C. L. Kinnier, County Engineer, Arlington County, Arlington, Va.; Charles H. Moon, Surveyor and Engineer, Bucks County, Woodburne, Penna.; and Thomas Smith, Chairman, Board of County Commissioners, Seattle, Wash.

The officers and directors of the Manufacturers' Division are: President, William M. Parrish, Industrial Sales Executive, International Harvester Co.; Vice President, Chauncey B. Smythe, Vice President, Thew Shovel Co.; Secretary and Treasurer, H. N. Schramm, President, Schramm, Inc.; Directors, R. W. Cornelison, Vice President, Northwest Engineering Co.; C. D. Macpherson, Hoist & Body Div., Gar Wood Industries, Inc.; Chauncey B. Smythe, Vice President, Thew Shovel Co.; Frank T. Sheets, President, Portland Cement Association; Joseph S. Helm, President, The Asphalt Institute; C. E. Dawson, General Motors Fleet Sales Corp.; Frank G. Hough, President, Frank G. Hough Co.; and Charles M. Upham, Engineer-Director, A.R.B.A.; with Robert R. Nixon, President, Associated Equipment Distributors, and Herbert R. Anderson, President, Highway Contractors' Division, A.R.B.A., as Associate Directors.


ON BIG CONCRETE JOBS THEY'RE SAYING—

"tie faster with Richmond Ties"

Practically every new bridge job on NEW YORK'S Circumferential HIGHWAY will be Richmond-Tied

See "Sweet's" 3-31.

RICHMOND SCREW ANCHOR CO., INC.

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International Harvester's

FOUR NEW DIESEL POWER UNITS

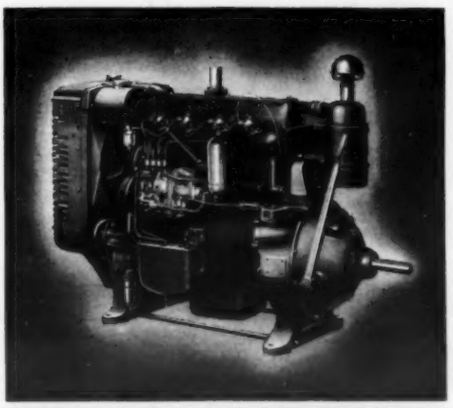
International Harvester scores another success in the Diesel field with FOUR NEW DIESEL POWER UNITS. Here is *smooth, economical* Diesel Power in *compact, convenient form—easily installed, simple to operate*—ready to solve your power problems and cut your power costs. These engines range in size up to the UD-18, rated 100 h.p. at 1,400 r.p.m.

This good news for all users of power follows the introduction of International's FOUR Diesel TracTracTors for 1940. Now you can get International Diesel *design, quality, performance*—and International *full* DIESEL fuel economy—in *various sizes* of power units and crawler tractors . . . making it more profitable than ever to standardize on this famous line and enjoy all the advantages only Harvester can provide.

The big 6-cylinder International UD-18 Diesel—100 h.p. at 1,400 r.p.m.—is a money maker, no matter how you figure. Other models are the UD-6, UD-9, and UD-14.

International Diesels operate on small quantities of low-priced fuel. With International's starting system, they are *ready to go*—no delay or loss of time getting started on the job. They are engineered in every detail for *economy of operation, economy of maintenance, and long heavy-duty service.* Each one is ruggedly built for the toughest working conditions.

Whatever your power needs, investigate this new line of International Diesel Power Units. The nearby International industrial power dealer or Company branch will give you complete information. The International line also includes power units for gasoline, gas, and distillate operation.



Here is International Harvester's small Diesel, the UD-6 (shown equipped for indoor use). This 4-cylinder engine packs a lot of power for its size and has the stamina to stand up under the toughest kind of operating conditions.

INTERNATIONAL HARVESTER COMPANY (Incorporated)

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PILE HAMMERS and EXTRACTORS

HOISTS—DERRICKS WHIRLERS

Special Equipment Movable Bridge Machinery

Write for descriptive catalogs.

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Distributors in Principal Cities

### A Hammer Stone Crusher With Large Production

The Jeffrey Miracle hammer crusher designed for the reduction of large pieces of limestone, shale, slag and cement rock and built to take average shovel size stone, crushing them into 4, 3, 2, 1 and ½-inch sizes in one operation, is described rather completely in Bulletin 729, which has been issued by the Jeffrey Mfg. Co., Columbus, Ohio. This bulletin contains tables of the approximate speeds, capacities and power of these hammer crushers, together with typical results when crushing limestone. Copies of this bulletin may be secured free on request by readers mentioning this magazine.

### 1940 Catalog on Line Of Barrows and Scrapers

The American line of wheelbarrows for concrete, aggregates and other materials, cement and concrete buggies, fresno and drag scrapers, and road drags is fully described and illustrated in the 1940 catalog of the American Steel Scraper Co., Sidney, Ohio. Several of the American wheelbarrows are of new design and are available with steel or pneumatic-tired wheels.

Copies of Catalog No. 64 may be secured by contractors and state and county highway departments direct from the manufacturer by mentioning this item.

### New 1940 Black-Top Paver

Features of the 1940 Adnun Black Top paver, made by the Foote Co., Inc., Nunda, N. Y., include hydraulic controls for easier and faster operation, a power cut-off with hydraulic control of the gates for laying under all conditions, the overlapping and crowding action of the cutter-bar strike-off which makes a tight positive joint with the parallel course or curb, the adjustability of the cutter-bar speed for handling various classes of materials, and continuous course correction, making possible the automatic correction of hollows and bumps with each successive course.

These and other features of this 1940 paver are described in detail in a new 20-page illustrated catalog, copies of which may be secured direct from the manufacturer by mentioning this item.


WHAT DO YOU KNOW ABOUT ASPHALT?

Q. If you wanted the very finest street paving, regardless of cost, what would you use?

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Q. For the *least* expensive, yet effective road improvement program, what would you use?

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Q. What is a "SEAL COAT?" (and we don't mean fur.)

A.....

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HERE ARE ALL THE ANSWERS

HERE ARE ALL THE ANSWERS.... in this *new* book on Asphalt just issued by the Standard Oil Company (Indiana). And *your* free copy is ready. Call your local Standard Oil Office, or write direct to 910 South Michigan Avenue, Chicago.

*Asphalt for every purpose* STANDARD OIL COMPANY (INDIANA)

# Nevada Erects Steel Overpass

## Three-Span Rigid-Frame Structure at East Ely Eliminates Hazardous Railroad Grade Crossing

By RICHARD R. TIPTON, Associate Highway Bridge Engineer, Public Roads Administration, San Francisco, Calif.

(*Photos on page* 44)

✦ U. S. Route 50 crosses the tracks of the Nevada Consolidated Copper Co.'s railroad at the east limits of Ely, Nevada. The highway passed over four tracks of the east portion of the railway switching yards on a curve and, as the dark-gray-colored ore cars were not easily distinguishable at night, several serious accidents resulted from cars crashing into the sides of the slow-moving trains.

To eliminate this hazard, the Nevada Department of Highways relocated the route through East Ely and constructed an overpass structure approximately 500 feet east of the existing grade crossing. The new structure consists of three spans, the center span being 84 feet long and the two end spans each 43 feet 6 inches in length.

Preliminary studies made by the Public Roads Administration engineers and the Nevada Department of Highways indicated that a structural-steel rigid-frame structure would be the most economical and best suited to the site. By using this type of structure, it was possible to keep the approach fill heights to a minimum. The end spans are composed of a suspended span 27 feet long supported by the 16-foot 6-inch cantilever arm of the rigid frame and the end abutment on the approach fill.

The end abutments are founded on treated timber piles driven through the fill into the original ground. This type of construction permitted the contractor, Frederickson & Westbrook of Sacramento, Calif., to place and compact the approach fill with maximum efficiency, prior to any structural work. The 127,000 cubic yards of approach fill material was obtained from a pit approximately a mile north of the project. The material was excavated in the pit by a ¾-yard Koehring shovel and hauled to the fill in Ford dump trucks. Spreading and compacting on the fill was done with a Caterpillar RD6 and bulldozer and a sheepsfoot roller.

Structural steel during erection of the East Ely overpass.

Work on the project was started November 23, 1938, and the approach fills were placed and the treated timber piles driven during the winter period. The abutment piles were driven with a 3,000-pound gravity hammer in swinging leads attached to the boom of the Koehring shovel-crane.

Ely is located at an elevation of 6,200 feet above sea level and is subject to very cold weather during the winter so that the contractor decided not to attempt any concreting until spring. The concrete for the footings under the center piers was poured during the last week in March, a two-sack Jaeger mixer being used to mix the concrete.

### Steel Work

The structural steel, which was fabricated in the Alameda, Calif., shops of the Bethlehem Steel Co., was erected and riveted from the tracks with practically no delay to rail traffic. The column sections with the haunched part of the girders were erected on falsework. The center portion of the main span, which was fabricated from a 33-inch rolled section, was then bolted in place. The falsework was removed and the end suspended spans were placed. This work was done during the last two weeks in April.

The slabs for the roadway forms were supported on wooden jacks resting on the lower flanges of the girders. The outside overhang was framed on needle beams clamped to the bottoms of the two outside girders. The steel rail and the reinforced concrete roadway slab were completed on May 31.

### Personnel

The total amount of the contract for this overpass, which was opened to traffic on July 8, 1939, was $77,000, the cost being divided equally between the approach fills and the structure proper. Oliver Pope was Superintendent for Frederickson & Westbrook of Sacramento, Calif., on this job. The steel work was erected by the Bos Construction Co., of Oakland, Calif. For the Nevada Department of Highways, A. G. Kinne was Resident Engineer and Paul Robbins, Bridge Inspector, under the supervision of C. C. Boyer, Division Engineer at Ely and E. T. Boardman, State Bridge Engineer. Robert A. Allen is State Highway Engineer.

*The only way to insure the use of gasoline and motor vehicle taxes for the purpose for which they are intended, our highways, is to make the diversion of such funds unconstitutional.*

THE MODEL 20 AMERICAN *General Purpose* HOIST.

**Has Many Features Found In No Other Hoist In Its Price Class**

Forget about all the small hoists you have ever seen when you consider the AMERICAN Model 20 General Purpose Hoist. It's a Genuine AMERICAN Hoist, with all that famous AMERICAN Quality, shrunk down in size and price — especially price — to fit the work and equipment budget of the small contractor and industrial user.

Write for Bulletin 100-H-0 and price — and if you will need a small hoist this spring, better put in your bid early; from the way the demand for the Model 20 is shaping up now we can see that we have our work cut out to satisfy the demand.

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NEW YORK SAINT PAUL, MINNESOTA CHICAGO
AMERICAN TERRY DERRICK CO.

DO IT BETTER
DO IT CHEAPER

If you want plenty of power . . . speed . . . sturdy construction . . . low operating and maintenance cost . . . dependable service and properly engineered features, investigate HUBER. Write for complete descriptive features.

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MARION, OHIO, U. S. A.

6 SIZES 5 to 12 ton GAS or DIESEL

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FOR SAFE WIRE ROPE FASTENING

STANDARDIZE on the Genuine CROSBY CLIP

PERFECT GRIP • DROP FORGED STEEL • HOT DIP GALVANIZED

DEALERS WITH STOCK IN ALL PRINCIPAL CITIES

# New Levees Built At Portland, Ore.

## Only Four Large Machines Used by Edelfsen-Weygandt To Build Levees and Place Riprap to Check Erosion

By HENRY W. YOUNG

✦ PENINSULA Drainage District No. 2 in Oregon comprises an area of rich sub-irrigated bottom lands lying between the Columbia River and Columbia Slough at the northern edge of the city of Portland. In the past, flood waters have been kept out partly by an old levee system extending roughly in a U shape along the banks of the river and slough and across the bottom. This levee was never high enough and recently has been badly in need of repair.

Last year, under the 1936 Flood Control Act, the U. S. Engineer Department started to rebuild about 4 miles of the old levee, bringing it all up to Elev. 33.3, which is above the highest recorded flood, and putting the whole levee in first class condition.

The contract for the work was awarded to Edelfsen-Weygandt Co. of Portland on its bid of $88,165.25. In addition to the earth work which comprised about 52,000 cubic yards of embankment, there was included about 17,640 cubic yards of stone riprap at various points where there is most danger of river encroachment, some 2,500 linear feet of 6 and 8-inch concrete-pipe drains, and a small amount of concrete wall.

Edelfsen-Weygandt started work about the middle of last July and completed the job early in December, 1939. The contractor made excellent progress with a minimum amount of equipment, there being only four pieces of major equipment on the job, exclusive of trucks used for hauling some of the borrow.

### Dredge Handles Rock Work

A hired dredge with steam-operated equipment was used for placing the rock. This dredge had a 95-foot boom rigged with a 2-yard Stockton clamshell bucket which took the rock from barges and dumped it into place. The rock riprap on the outer slope of the levee was reduced in thickness from 2½ feet at the toe to 1½ feet at Elev. 5. From Elev. 5 to Elev. 22, the rock was hand laid and was reduced to 1 foot in thickness.

The rock came from the Coffin Rock quarry of the Star Sand & Gravel Co., located 58 miles downstream, and had to be towed up on barges. It was a hard blue rock resembling andesite, breaking rather too small for fast handling by the bucket. It was graded as 200-pound rock, very little running over that and the bulk of it being much smaller. It was, therefore, difficult for the dredge bucket to grab a good load at the first attempt. Notwithstanding this difficulty, the rock work progressed relatively as fast as the rest of the job.

### The Earth Work

Most of the earth work was handled by an Austin-Western 12-yard self-loading scraper, drawn by a Caterpillar RD8. Assisting it was another Caterpillar tractor with bulldozer which cleared the way, leveled off the top of the embankment, sloped the sides to a 3 to 1 grade, and handled a small amount of the dirt moving by pushing it up on the land-side of the embankment.

Borrow pits adjacent to the embankment were available for the most part, so that the scraper swung down to the pit, gathered its load and returned to the top, the total trip not exceeding 600 feet when the embankment was nearing its full height.

There were a few places, however, where no borrow pit was available adjacent to the embankment. For these places five International 5-yard dump trucks, served by a P & H 206B dragline with a 1¼-yard bucket, were employed. This dragline also handled the toe trench excavation. The unit moved around to take material from nearby mounds and hummocks, leveling off and reclaiming some land in this manner. The haul for the trucks was up to a half mile.

### Job Operated Safely

The U. S. Engineer Department reports that not a single accident involving personal injury occurred on this job. This is attributed partly to the careful and thorough safety program of the U.S.E.D. and partly to the wholehearted cooperation by the contractor, his supervisors and force in carrying out the program of analyzing and reducing all possible hazards to a minimum.

This work was done under the supervision of Major C. R. Moore, District Engineer, U. S. Engineer Department.

### Line of Asphalt Products For Highways and Bridges

The line of Servicised products, which includes felt-sided asphalt expansion joints, metal shield joints with extrusion chambers, cork and sponge rubber expansion joints, asphalt plank for bridges,

waterproofing protection courses for bridges, overpasses, tunnels and similar structures, and moulded and extruded specialties, is described and illustrated in a new 16-page catalog recently issued by the Servicised Products Corp., 6051 W. 65th St., Chicago, Ill.

Copies of this catalog "Servicised Products" may be secured by interested contractors and engineers direct from the manufacturer by mentioning CONTRACTORS AND ENGINEERS MONTHLY.

## LeTourneau General Catalog

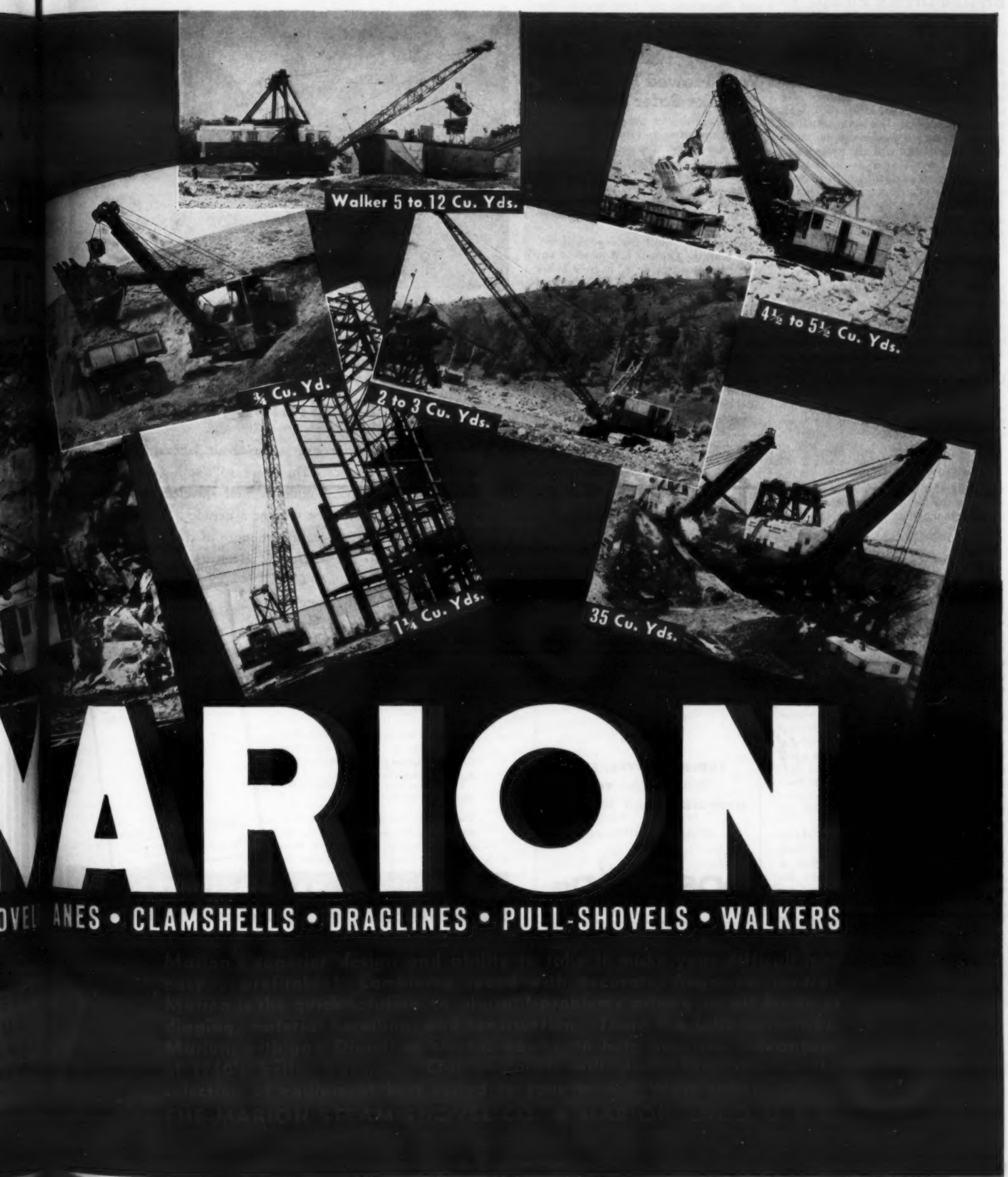
A new 1940 32-page general catalog, picturing and describing the entire LeTourneau line and services, has recently been released by R. G. LeTourneau, Inc., Peoria, Ill., and Stockton, Calif., manufacturer of Carryall scrapers, Angledozers, bulldozers, sheepsfoot rollers, and tractor cranes.

This new catalog has been written as though two men, an operator and a contractor or engineer, were talking over and pointing out the features and advantages of the different tools to them. In addition to looking over the entire line, the operator and contractor visit the LeTourneau factory and see the construction and manufacture of the various machines, and learn about the Tournacar welding service and the LeTourneau engineering and publication aids.

Copies of the LeTourneau 1940 general catalog are available on request.

## New Buda Chief Engineer

Announcement has just been made of the appointment of Harold G. Smith as Chief Engineer of the Engine Division of the Buda Co., Harvey, Ill. Mr. Smith, who is a member of the Society of Automotive Military Engineers as well as a member of the Engine Standards Committee of the Society of Automotive Engineers, has been associated with the engine industry for a number of years.


Walker 5 to 12 Cu. Yds.
4½ to 5½ Cu. Yds.
¾ Cu. Yd.
2 to 3 Cu. Yds.
1¼ Cu. Yds.
35 Cu. Yds.
MARION
OVEL ANES • CLAMSHELLS • DRAGLINES • PULL-SHOVELS • WALKERS

One of a new line of gasoline-engine-driven centrifugal pumps.

## Engine-Driven Pumps For Unwatering Jobs

To provide independently powered pumps for drainage, irrigation, sand and gravel washing plants, unwatering caissons and similar applications on construction jobs, the Allis-Chalmers Mfg. Co., Tractor Division, Milwaukee, Wis., has introduced a line of centrifugal pumps driven by gasoline power units. As these units are entirely independent of any outside source of power, they are also being used as standby units in emergencies when other sources of power fail. The pump and engine are mounted on a steel base, making them easily handled and readily transported by truck from job to job.

Power units in five sizes from 18 to 110-hp are available, with a choice of gasoline, kerosene, distillate, natural gas or butane as fuel. All units have valve-in-head medium-speed engines, with removable cylinder liners, efficient cooling systems, force-feed lubrication and a variable-speed governor.

The centrifugal pumps are of the horizontal-shaft single-stage single or double-suction types, designed for handling liquids at normal temperatures with high efficiency. The units are available in many combinations to meet requirements in quantity and pressure up to 5,000 gpm and 100-foot heads.

Form MS 253 describing these engine and pump units may be secured by interested contractors and engineers direct from the manufacturer or from this magazine.

## New Giant Truck

One of the outstanding exhibits at the A.R.B.A. Road Show was that of the Diamond T Motor Car Co. of Chicago, which featured the largest gasoline-powered truck exhibited, the new super-heavy-duty Diamond T 12-ton six-wheeler. This model has a gross rating of 40,000 pounds and at the Show carried an 8-yard dump body.

For this type of service the 501-cubic inch Diamond T-Hercules RXB engine is supplied, although the larger and more powerful RXC engine is available if desired. Two transmissions are used, providing a total of twelve forward speeds and two reverse. Drive is to both rear axles which are of the dual reduction type. The tires are 9.75-24 all around.

Also on display was the special Model 509H with a 2½-yard dump body, built to the same specifications as the fleet of forty recently put into service by the Illinois Division of Highways and including many special features of design. Boxes were built into the front of the body for carrying road signs, and a special tool box mounted back of the cab to carry shovels and other road-maintenance equipment. This model has a gross rating of 16,000 pounds and is powered by a Diamond T 268-cubic inch Super-Service engine. An oversize two-speed axle is employed, equipped with 8.25-20 dual tires. Special equipment includes auxiliary headlights and a red flasher light at the top of the cab.

An interesting new bulletin, entitled "The Key to Lower Costs", describing and illustrating the 1940 line of Diamond T heavy-duty trucks may be secured direct from the manufacturer by mentioning this item.

## Well-Mowed Roadsides Make Safer Highways

In promoting a consistent program of highway safety and roadside improvement, weed control is an important factor. Built exclusively for highway mowing service, the Model KM Centaur highway mower is designed to provide complete weed control, according to the manufacturer, the Centaur Corp., Greenwich, Ohio.

A ruggedly built high-speed heavy-duty unit, the Centaur KM mows at any angle from vertical to 45 degrees below horizontal. Built with a low center of gravity, it safely rides the slopes of cuts, fills and embankments. It is powered by a LeRoi 25-hp engine, and its cutter-bar speed is in direct ratio to the engine speed. It is equipped with a vacuum power lift for the cutter bar. When a hidden object is struck, the cutter bar is automatically released and swings parallel to the mower without damage to the machine or danger to the operator, and without disconnecting the driving mechanism.

The Centaur has four speeds forward and mows up to 2 miles an hour in first gear, 4½ miles an hour in second gear, and 7 miles an hour in third. Ditches and slopes are mowed in first and second gears, straightaway in third, and the machine in transit travels at 20 to 25 miles an hour.

Complete details on the Centaur KM mower are contained in an illustrated bulletin, copies of which may be secured by interested state and county highway engineers direct from the manufacturer or from this magazine.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POWER SHOVELS
DRAGLINES
CRANES

TRUCK SHOVELS, ETC.
⅜ to 2½ Cu. Yds.
HERCULES ROAD ROLLERS

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MARION OHIO

SETTING NEW STANDARDS
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Denver Steel and Iron Works Company . . . . . Denver, Colo.
The Lane Pipe Corporation . . Bath, N. Y.
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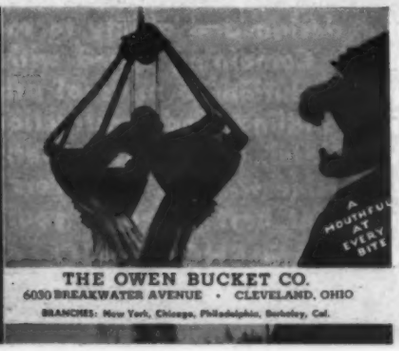
CLAMSHELL BUCKETS
Distinctive
DIGGING FACTORS
SPEEDY bucket operation is dependent in a large measure on *rapid dumping action*. Concentration of weight at the lower block exerts a direct pull on the cable resulting in quick opening of the bucket. Interior shell curvatures and surfaces are designed for a minimum resistance to materials being discharged.
Rapid DUMPING Action for HI-SPEED OPERATION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Name_____

# Heavy Hauling Units On Turnpike Grading

## Nello L. Teer, Durham, N. C., Handles Million Yards of Excavation, and Structures Through Juniata Gorge

(*Photos on page 44*)

✦ THROUGH the narrow gorge of the Raystown Branch of the Juniata River, just west of Everett, Pa., the line of the new 160-mile Pennsylvania Turnpike is located high up on the slope of Mt. Dallas, in order to clear the numerous utilities already located in the only break in the mountain ridge within a distance of 70 miles. Contract 44, Section 13D, for over 1,000,000 cubic yards of unclassified excavation and structures was awarded to Nello L. Teer of Durham, N.C., on his low bid of $795,244.27 on July 6, 1939, with 140 calendar days allowed for completion. The 3.38 miles of grading contract required heavy equipment on side-hill and through cuts and high fills.

### Big Fill at West End

A slow trip over Teer's contract to study it carefully, from the westerly end working toward Everett, showed a succession of heavy cuts, a township road relocation, and grade-separation structures, each with its own problem to be licked. The first 1,500 feet from the westerly end, going east, was a 25,000-yard fill which was made with five LeTourneau 12-yard Carryalls hauled by D8 tractors, with runs as long as 1,000 feet. The fill was spread with a Caterpillar D7 and hydraulic bulldozer and a Caterpillar D8 with an Angledozer, and the final grading was done with a Galion motor grader before the rolling with Buffalo-Springfield 10-ton 3-wheeled rollers. Some springs were encountered in the cut from which the material for this fill was excavated, requiring many feet of French drains and tile outlets.

### The Utilities Gang Up

At the end of this 1,500-foot fill, the utilities which make use of the Juniata Gorge ganged up, making considerable relocation necessary for the utilities, as well as added work for the contractor. In order to get its lines out of the way, the American Telephone & Telegraph put in a new permanent pole line over the mountains. The United Telephone Co. installed a temporary pole line until the construction of the Turnpike has been completed and then it will install a permanent line. The Pennsylvania Edison Co. moved its pole line across the Juniata River to a new permanent location to clear the Turnpike entirely. The Susquehanna Pipe Line Co., which has a cross-country gasoline pipe line, has relaid it in a new permanent location along the toe of the mountain adjacent to the Juniata River. The branch line of the Pennsylvania Railroad has not been disturbed by the Turnpike construction.

The first work the contractor had to tackle on this section was cutting an underpass for Township Route 05039 which has had to be relocated to the south side of the Turnpike in order to carry on construction. This work was done with a Marion 2-yard shovel loading to six Ford trucks with 6-yard steel bodies and Thornton dual drives, and two International trucks with 8-yard Galion all-steel bodies, making 1,000-foot hauls.

### Township Road Relocation

The next item of interest to the east was a 2,800-foot fill with a long cut for the relocation of the township road above the Turnpike. This was done by making a side-hill cut and casting for the fill on the lower side. The Turnpike and township relocation cuts intersected and ran parallel for about 4,000 feet through quartzitic ledge. The cut for the township road, 34 feet wide, was made with a wagon drill and jackhammer, using six to eight men on drilling.

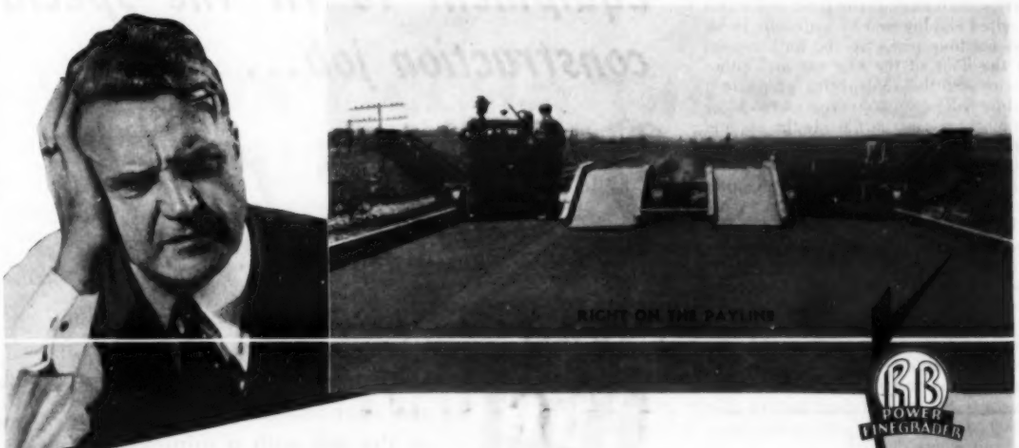
Along the north side of Mt. Dallas, the township fill has its toe along the old township road as a bench. It was necessary for the contractor to get the relocation of the township road completed before the fill for the Turnpike could be made. Also along this line, the old gasoline pipe line was in a very shallow trench, making it necessary for great caution to be exercised lest rocks rolling from the cut high on the side of Mt. Dallas might damage the line and cause serious trouble before the new permanent gasoline line was completed lower down the slope. On the township relocation, a Lima 2-yard shovel with six hired trucks for hauling worked in heavy boulder formation, requiring a great deal of mud capping. Traffic on the old township road below

*C. & E. M. Photo*

**A standard dynamite magazine on the Nello L. Teer contract near Everett on the Pennsylvania Turnpike.**

this cut was stopped frequently to permit blasting of these boulders. The echoes of these shots in the narrow valley sounded as though several batteries of heavy artillery had been discharged in unison. To speed up the digging of drainage pipe trenches, a

(*Concluded on page 43*)


RB POWER FINEGRADER

It's going to be a headache if you don't— put an R. B. Power Finegrader on the job this year to replace wasteful, job-jamming hand methods of finegrading.

You know what it costs you to build the finegrade by hand—running a scratchboard over and over—building up the low spots by trial and error—pouring extra slab to compensate for inaccuracies—putting in as much as 7% extra material*—slowing up the paver.

You can eliminate this headache with an R. B. Finegrader—one pass over the rough grade gives you a smooth, accurate surface that's *right on the payline*—no "donation" of extra material! Plenty of grade ahead—no delays for the paving crew! No difficulties in handling grade line changes! No trouble putting material where you want it on the shoulders!

Turn your headache into profits with an R. B. Finegrader—one good job and the machine pays for itself. Get the whole story today. BUCKEYE TRACTION DITCHER COMPANY, Findlay, Ohio. *Representatives in Principal Centers.*

*The State average for loss of yield in a number of states.

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SAND'S-STEVENS Line & Surface LEVEL

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Level is easily and quickly attached to line. Special feature construction prevents accidental detachment from line. Construction is sturdy, and accuracy guaranteed.

SAND'S LEVEL & TOOL CO.
8831 Gratiot Ave. Detroit, Mich.

The Butler cement car unloader.

## Moving Bulk Cement With Minimum Dust

Unloading a box car of bulk cement is a heartache for the contractor if he has it done by hand. A small tractor, capable of turning around inside a box car and capable of moving 900 pounds of cement per load in its bucket has been developed by Butler Bin Co., Waukesha, Wis. This Butler Cement-Hog is operated by a 4-cylinder gasoline engine, and carries the bucket on the front end which is raised and lowered by hydraulic jacks. The machine picks up the bulk cement off the floor of the box car and either carries it to the door of the car where it is dumped into a conveyor or truck, or the machine can run outside the car and deposit the cement at some distant point.

One operator, with a helper to remove bulkheads, clean corners and do other odd jobs, can unload a 300-barrel car in less than 1½ hours. With the bucket lowered to the floor, the tractor pushes it into the pile, lifting the scoop as it moves ahead. He then backs out, turns and heads for the door of the car. Then, with the tractor still inside the car, the scoop projects far enough outside the car door to empty into a convenient hopper screw conveyor which carries the cement to the usual storage hopper. The bucket can be raised 4 feet 6 inches above the floor where desired.

## What Kind of Rope Do You Really Need?

You may be sure of the size of rope you want, let us say—a ¾-inch wire rope, then what? Is the rope to be used for hoisting steel girders or for towing a log raft? For operating an elevator or a power shovel? Perhaps you are going to use it for cable tool drilling or for pile driving. Or for guying up a tower or mooring a vessel, or operating an incline or a dredge. It may be for a swing line, a drag line, boom line, tag line, closing line, tight line, slack line, choker, or sling.

Just how many strands should the rope have? How many wires per strand? Should it have a hemp or wire center, should it be lang lay or regular lay, right lay, left lay, or alternate lay, non-rotating, preformed or standard rope, plow, cast steel, iron or galvanized?

This gives you some idea of the ramifications possible in just one size of wire rope and then there are lines of other constructions manufactured in smaller sizes only for such purposes as aircraft strand, sash cord, and guard rail, and in larger sizes only, for hawsers, rotary drilling, suspension bridges, etc.

The importance of getting the right rope for the job cannot be over-rated. Contractors and state highway departments should depend on the recommendations of rope manufacturers to be sure that the proper kind and type of rope is purchased to give the greatest service for the particular work. Broderick & Bascom Rope Co., 4203 No. Union Boulevard, St. Louis, Mo., not only offers this service to users of Yellow Strand wire rope, but regularly publishes a very helpful booklet on the use of various kinds of rope under the title "The Yellow Strand." For either service or copies of this booklet, write to the manufacturer direct, mentioning this item.

## New Lima Shovel Dealer

Garfield & Co., of San Francisco, Calif., has been appointed distributor for the complete line of Lima shovels, draglines and cranes in the northern California and Nevada territory, according to a recent announcement by the Shovel & Crane Division, Lima Locomotive works, Inc., Lima, Ohio.

The Garfield company, of which G. A. Garfield is the head, was organized in 1915 and has continuously served the construction and mining industries since that time. In addition to its headquarters office in the Hearst Building, the organization also maintains adequate warehousing and service facilities in San Francisco.


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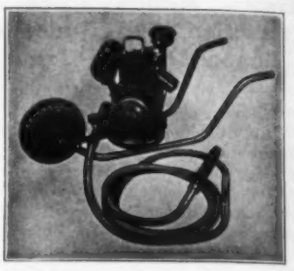
*(Gas and Electric)*
**Concrete Surfacing Attachments**



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***Equipment to fit the special needs of any construction job...***

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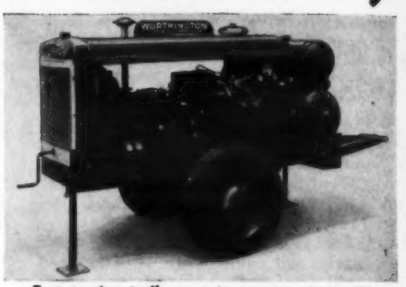

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COMPACT—POWERFUL—SAFE
"For use where power is not practical or available"
Manufactured in 2, 5 and 15-Ton Sizes.
For capacity comparison, ½" cable used:
2-Ton "Lightweight" ..... 75 ft.
5-Ton "General Utility" ..... 250 ft.
15-Ton Triple-Geared "Special" .....1200 ft.
Patent instant gear change and positive internal brake that never fails, and will lock load. Price, f.o.b.

| Gear Ratios | Weight | Seattle |
|---|---|---|
| 2-Ton 4, & 22 to 1 | 60 lb. | $ 50 |
| 5-Ton 4, & 24 to 1 | 110 lb. | $ 75 |
| 15-Ton 4, 19 & 109 to 1 | 680 lb. | $250 |

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**THIS LITTLEFORD EQUIPMENT MEANS LOW COST . . ROAD MAINTENANCE**

84-HD Kettle—This tar and asphalt kettle gives faster heating, continuous flow of materials. Made in sizes from 75 to 300 gals.

Wheeled Roller—This motorized self-propelling unit can be trailed from one job to another behind any truck. Designed to roll patches.

Traf-O-Line—Here is the traffic line marking machine that will put down one or two lines. Single valve controls the starting and stopping.

Each Black Top Road Maintenance Unit with the Littleford Trade Mark is your assurance of low cost operation. Every unit is designed and engineered to function efficiently—built sturdy to last longer, gadgetless to eliminate parts to wear out. When buying Road Equipment, insist on a Littleford. Make it an investment, not just a purchase.

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LITTLEFORD BROS.
485 E. PEARL ST.
CINCINNATI, OHIO

# Madison County Adds To D.B.S.T. Mileage

(Continued from page 7)

to a minimum width of 18 feet.

The first operation is to sweep and blow the road to remove all of the loose material. While this operation is somewhat objectionable to the adjoining property holders, they do not kick, since they know that this is the end of the dust nuisance. Anyone who has operated or observed a country store on a dusty road will appreciate the value of a dustless surface.

The prime coat of cold refined tar (Tarvia B) is then applied at the rate of approximately 0.25 gallon per square yard. This is allowed to soak into the surface for a few hours and then is covered lightly with coarse sand. The road is then opened to traffic and may be under traffic for some time before the wearing course is applied.

Prior to the application of the double tar surface treatment, the road is again cleaned to insure a thorough bond of the tar to the primed base. Hot binder tar (Tarvia X) is used for the bottom layer of the double surface treatment. It is heated to approximately 250 degrees F. and applied to the tar-primed base course at the rate of 0.4 gallon per square yard. This application is covered with about 50 pounds of broken stone per square yard, which is rolled in place.

This surface is immediately sealed with an application of hot surface-treatment tar (Tarvia A), heated to approximately 200 degrees F. and applied at the rate of about 0.33 gallon per square yard. The tar is covered immediately with approximately 30 pounds of stone chips per square yard. The chips are rolled in place and the road opened to traffic.

### Plans for Future

By continuing work of this sort, the Board of County Commissioners plan to have an economical, dustless, skid-safe road through all of the towns and villages of the county by the end of this year, and sufficient construction so that by the end of next year no resident of the county will be more than 4 miles from a treated road.

The present Board of County Commissioners consists of Joe Van Valkenburgh, Chairman; Joe Quick, J. W. Gray, C. O. Mann, and J. S. Brown, members. L. G. Smith is County Engineer.

## New Euclid Scraper Self-Powered Unit

One of the entirely new pieces of dirt-moving equipment which made its debut at the A.R.B.A. Road Show in Chicago was the Euclid self-powered hydraulic-controlled scraper, recently developed by the Euclid Road Machinery Co., Cleveland, Ohio.

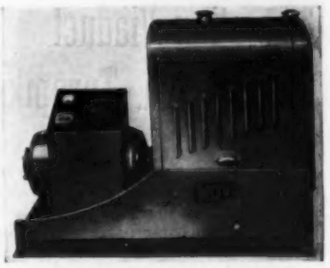
This Model M, which is powered by a 100-hp gasoline or diesel engine cantilevered at the front, has a struck-measure capacity of 10 yards and a cutting width of approximately 8 feet. The load is concentrated on the large drive wheels which are equipped with 18.00 x 24 20-ply tires, while the steering-wheel tires are 13.50 x 24 16-ply. A complete selection of five speeds both forward and reverse makes turning unnecessary and speeds up the trip cycle. When traveling up-grade in reverse, traction is further increased by the increase of weight on the drive wheels.

The Euclid hydraulic system gives quick accurate control of all movements. Speedy positive dumping and easily controlled spreading are obtained by the improved Euclid ejector. The front pusher plate and cushioned rear bumper block enable one unit to help another in extremely tough spots or when loading.

Further details on the new Euclid Model M self-powered scraper are contained in literature which the manufacturer will be glad to send on request.

## New Generator Set

A new line of generating sets to provide light for night work or power for the many electric tools now used on construction jobs has recently been announced by the Novo Engine Co., 216 Porter St., Lansing, Mich. There are fifteen different sizes available, direct or alternating current, powered with air or water-cooled gasoline engines or diesel power units.



One of the new Novo generators.

Features of these sets are their close-coupled design, portability, and the switch panel with no open switches or fuses to burn out.

A new bulletin on these Novo generating sets has just been issued, copies of which may be secured by interested contractors and state and county highway engineers direct from the manufacturer.


STOP PAYING FOR PUMPING AIR

PAY ONLY FOR PUMPING WATER!

Rex Speed Prime pumps are the only pumps with the unique *air peeler* which positively prevents costly recirculation of air when the pump is priming—helps it pump nearer to full-rated capacity at all times! This is only one of many unique advantages you get when you buy Rex Speed Prime pumps! Send for this book to get the whole story on all sizes from 1,000 to 125,000 gallons per hour!

Address the Chain Belt Company, Dept. P-4, 1666 West Bruce Street, Milwaukee, Wisconsin.

REX PUMPS

WE DON'T CLAIM THE WORLD FOR WALTER TRACTOR TRUCKS

You wouldn't use a sledge hammer to drive a carpet tack. Neither would you use a powerful WALTER TRACTOR TRUCK for ordinary hauling on good roads. There are plenty of jobs on which an ordinary truck will do as well as a Walter.

But when you have to buck a heavy snowdrift, pull a big dirt carry scraper fast, haul heavy loads where there are no roads, or do any one of a hundred mean jobs, you need WALTER FOUR-POINT POSITIVE DRIVE. Nothing less will do.

Above, to the right, and below, we show Walter Tractor Trucks in their own element. These are a few of the tough jobs that have made Walter 100% Traction a well known phrase among truck users. Trying to use ordinary trucks on such work is about as sensible as trying to use a tack hammer on a railroad spike. Study the partial list of Walter features below and then send for literature.

WALTER FEATURES

Torque-Proportioning Automatic Lock Differentials.

Suspended Double Reduction Drive, with Low Unsprung Weight and High Ground Clearance.

Ten-to-One Range Transmission, with Five Forward Speeds of High Efficiency. Single Lever Control, Giving Fast High Gear and Very Powerful Low Gear for All Emergencies, with Proper Intermediate Ratios for All Operating Conditions.

Four Heavy Duty Internal Shoe Brakes, Protected from Mud, Snow and Ice. Where Required, Another Pair of Heavy Duty Shoe Brakes at Rear Wheel Hubs Is Provided. More complete information upon request.

WALTER MOTOR TRUCK CO.

1001-19 IRVING AVENUE, RIDGEWOOD, QUEENS, L. I., N. Y.

# Concreting Viaduct On Penna. Turnpike

(*Continued from page 9*)

girder and also the first of the I-beam spans. Because of this the outer footings of Pier 3 are larger than the footings for the center pier. The footings for Piers 1 and 2 are of uniform size, varying in grade only due to the depth of rock. They are 11 x 61 feet in plan and 3 feet 6 inches high. They carry solid piers of uniform thickness measuring 6 feet thick inside the coping and 6 feet 6 inches at the top. They are battered ½-inch in 12 inches, making them 8 feet 3 inches thick at the bottom. The noses of the piers are rounded, coming to a point like a horizontal Gothic arch, and the noses are also battered according to the design radius.

Pier 1 is 26 feet 11½ inches high to the bottom of the 2-foot 6-inch coping and Pier 2 is 29 feet 8½ inches high to the same point. The design bearing on Piers 1 and 2 was 3.1 tons per square foot, while the bearing for Pier 3 was 7 tons per square foot.

### Method of Construction

To facilitate excavation in the construction of the piers, the contractor built a heavy temporary construction trestle across the river 50 feet center-to-center between the piers and trestle. On this a Clyde Whirley Model 75 electric derrick with an 85-foot boom, a National hoist and a Lidgerwood swinging engine was erected with a span of 18 feet between the rails. This derrick was used to handle excavation, forms and concrete and was used at all piers except D and E and the east abutment, which it could not reach, so a Lorain 75 crawler crane had to handle the work on those three units. During the excavation the material was either clammed or hand-loaded to 2-yard skips, whichever best suited the conditions.

For unwatering the work during excavation, a 6-inch gas-powered self-priming Jaeger pump was used for the unwatering operation and then three 3-inch Domestic pumps and one 3-inch Jaeger electric pump, also self-priming, were used to keep the excavation dry.

### Typical Forms

Our illustration on page 9 shows the Whirley handling the panel form for one of the wings of the west abutment. This panel was 35 feet high and 45 feet wide and lined with plywood as it was the front form. The back form was not lined. To back up the plywood, 6 x 1⅛-inch form lumber was used, spaced 1 inch between to save lumber. The studs were 2 x 6's on 16-inch centers and the wales were double 3 x 8's with ½-inch tie rods which, after the concrete was poured, were backed out, leaving a 2-inch hole which was plugged with concrete and rubbed with the rest of the face.

### Concreting

Concrete for the piers, as well as the footings, was hauled ready-mixed from the New Enterprise Stone & Lime Co. quarry about 5 miles distant. The trucks delivered the concrete to 1½-yard Blaw-Knox buckets, or direct to the forms where such was possible. The buckets were handled by the derrick or crane and dumped into a hopper connected with an elephant trunk for placing the concrete in the river piers or legs of the land piers. A variety of vibrators were used on different parts of the work, including Jackson, Syntron, Master and Mall, as well as an Ingersoll-Rand air vibrator.

The concrete crew consisted of two men at the ready-mix truck handling the buckets, the crane or derrick operator, two men dumping the buckets, two vibrator men, and four men spading around the steel. On the east abutment and Piers D and E the concrete was buggied on a runway where the gantry could not reach. Metal-tired buggies were used.

### The Contractor's Shops

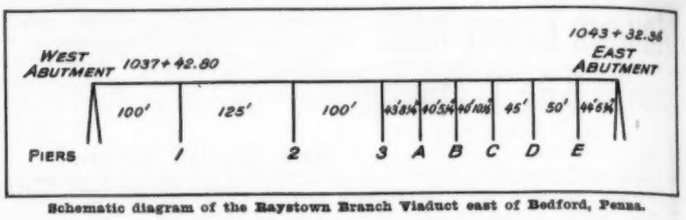
Under a substantial roof the contractor installed an Oliver woodworking unit with a hand wheel which shifted the circular saws from rip to cross cut quickly. Beside this was a band saw and an Oster threading machine for the tie rods.

The machine shop was very well equipped with a Weaver hydraulic press, a Black & Decker electric drill, a Hendey lathe, a power hack saw, a drill press, and a Black & Decker buffer. York Engineering Co. maintained all of its own equipment at this shop, not only for this contract but for an adjacent heavy grading contract which will be described later.

The forge in the machine shop had a smokestack composed of oil drums welded together and the smithy had an 800-pound anvil block with notches, slots and holes to hold practically any size or shape of bar for rapid bending. In addition to the blacksmith outfit, the contractor had an Oxweld Acetylene welding outfit and a Lincoln Stable Arc welder for repair work.

### Personnel

On this viaduct contract awarded to York Engineering Co., York, Pa., John Weidman was Superintendent, with Anthony Finnan as General Foreman. The superstructure was built under subcontract by the Phoenix Bridge Co., Phoenixville, Pa. For the Pennsylvania Turnpike Commission, E. A. Rush was Resident Engineer.




Schematic diagram of the Baystown Branch Viaduct east of Bedford, Penna.

## Diesel Electric Sets

To expand its line of diesel electric sets, the Caterpillar Tractor Co., Peoria, Ill., has recently brought out a 66-kw and a 52-kw unit. These two larger sets, known as the 11-52 and the 13-66, are completely self-contained and require no gadgets other than a circuit breaker. Both are powered by 6-cylinder heavy-duty diesel engines, and both require a minimum of maintenance and adjustments, according to the manufacturer. As in the case of the smaller sets, they can be set up and running within an hour after delivery.

There are now five models of these units available in 15, 20, 30, 52 and 66-kw capacities. Detailed specifications on any of these diesel electric sets may be secured direct from the manufacturer or from CONTRACTORS AND ENGINEERS MONTHLY.


WHETHER IT'S WIDENING, PATCHING, OR NEW CONSTRUCTION, BUFFALO-SPRINGFIELD HAS A ROLLER TO FIT THE JOB

THE BUFFALO-SPRINGFIELD ROLLER COMPANY
SPRINGFIELD, OHIO

BUFFALO-SPRINGFIELD

THE NATIONAL CARBIDE V-G LIGHT

Gives you daylight conditions on night jobs.
Spreads a full, even beam of 8000 candlepower right where you need it.

Lights up the job for twelve hours on one 7-pound charge of National 14-ND Carbide and 7 gallons of water. Is easily handled by one man; has nothing to get out of order; no harm done if it tips over—just stand it up again, and it goes right on working. Weight 35 lbs. empty; 98 lbs. when full.

X-100

*Write for catalogs on V-G Light, V-G Handy Light and Lantern*

NATIONAL CARBIDE CORPORATION
LINCOLN BLDG. NEW YORK
(Opp. Grand Central)

ASPHALT MIXING PLANTS

H & B—Stationary and portable mixing plants are designed and built to turn out maximum tonnage at minimum cost. These plants are available with batch capacities of 350 to 8000 pounds and are engineered to meet your individual requirements. Manufacturing is centralized in our own shops and each plant is completely assembled in our yard before shipment is made.

*Descriptive literature sent upon request.*

HETHERINGTON & BERNER INC.
ENGINEERS AND MANUFACTURERS
701-745 KENTUCKY AVENUE • INDIANAPOLIS, INDIANA

# "Save Roadside Trees" Theme of Iowa Job

## G. H. Lowe, Cedar Rapids, Wins Central Section Award For Unusual Care on 4-Mile Grading Contract

(*Photos on page 4*)

✦ THERE was a time when new or relocated highways marched through the countryside like an invading army, sweeping everything before them, including many fine old trees and all existing vegetation on the right-of-way. In the past few years, since roadside development has been recognized as an important phase of highway work, much more thought and care have been expended in the preservation of natural growth along the right-of-way for new highways or on relocation.

It was for his unusual interest and care in the preservation of trees and existing roadside vegetation that G. H. Lowe, contractor, of Cedar Rapids, Iowa, received the Central Section Award of the 1939 CONTRACTORS AND ENGINEERS MONTHLY Roadside Development Awards. The project, which was 3.933 miles in length, was started on July 6, 1939, and completed on October 10. The work involved widening the roadway of Route 9 west of Osage, Iowa, from 20 feet to 34 feet and some relocation in preparation for paving, during the course of which shallow ditches were constructed back of many existing trees along the roadside.

### Special Care of Trees

In nominating Lowe for one of the Awards, the Iowa state highway engineers stated that since starting roadside development work in that state, it has been particularly difficult to get grading contractors to use care in working around trees marked to be saved. Many trees have been barked, and it was therefore necessary for the state highway department forces to spend considerable time in trimming the bark, cleaning the wounds and painting them so that they would heal in the years to come.

It is reported that Lowe is often heard to remark to his men, "Let's preserve the trees which are to be saved," and the methods which he adopted truly achieved that result. Although he received pay for his work at unit prices which were less than half the rate ordinarily paid for roadside-improvement excavation, Lowe in many cases used methods which slowed up production in order to save many trees along the route, although this somewhat increased his unit cost per cubic yard.

In addition, many trees originally designated for removal were preserved, because of the careful manner in which this contractor handled the job. In other cases, where trees were removed, extra care was used to be sure that this work did not damage the branches of adjacent trees which were to be left standing.

Lowe's own attitude was reflected throughout his entire organization, with the result that every man on the job evidenced genuine interest in the roadside-development phase of the work.

The shallow drainage ditch constructed back of a row of maples, elms and pines, without injury to the trees.

### Some of the Difficulties

This job ran from Sta. 317+02.8 to Sta. 528+16.0. At Sta. 326 at a farm drive, the ditch grade lines were revised, making a break in the line of the drainage ditch at the driveway in order to allow for the construction of a shallow ditch back of two elms, thus preserving these trees.

(*Concluded on page 41*)


LAYING BLACK TOP?

JAEGER PAVER has 10 ADVANTAGES:

- 18 Ft. Movable Forms Give Smoothness of Concrete,
- 50% More Traction,
- No Load on New Material,
- Adjustable 9 to 15 Ft. Widths,
- Blends Perfect Joints,
- Capacity to 1000 Tons a Day,
- Lays Hot or Cold Bituminous, Stone or Macadam,

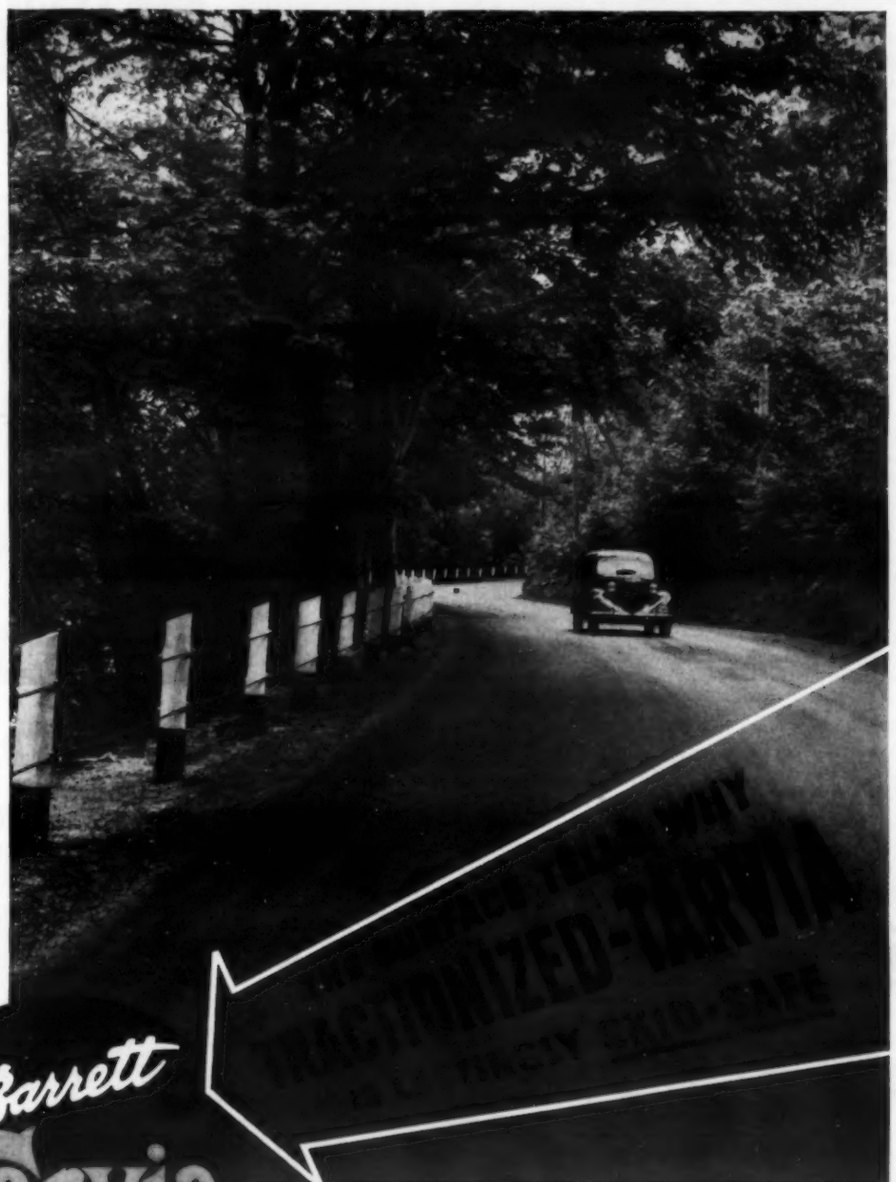
Ask also about Self-Leveling 10-12 Ft. Model BP-3, designed for Sheet Asphalt and Hot, Dense Mixes.

*Write for New Catalog, Prices.*

THE JAEGER MACHINE CO.
701 Dublin Ave., Columbus, Ohio

JAEGER





Barrett Tarvia
GOOD ROADS AT LOW COST

**The special tire-gripping surface of this Barrett-engineered road surfacing reduces danger of skidding to the minimum — even in slippery weather.**

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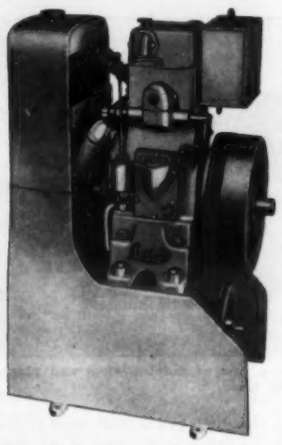


The Lister-Blackstone Powr-Pak.

## Compact Power Units With Diesel Drive

Powr-Pak, a new line of diesel-electric power plants ranging in size from 3,600 to 24,000 watts and built to a simple but entirely new space-saving design, has recently been developed by Lister-Blackstone, Inc., 1706 So. 68th St., Milwaukee, Wis.

These new plants consist of a radiator-cooled engine, generator and control panel, all assembled in compact form, ready to set in place and put to work. The chief change from conventional design is in the placing of the generator, which sets directly underneath the engine and thus cuts floor space requirements almost in half.

Power for generating is supplied by a Lister 4-cycle diesel engine using the Bosch fuel system. To assure long engine life, the cylinder walls are chromium impregnated by the Listard process. The patented dual-compression system used on all Lister diesels makes hand starting easy under all temperature conditions without the use of punks, glow plugs, or any other pre-heating devices, according to the manufacturer. Generators are available in any desired voltage or current, either direct current or single or three-phase alternating current.

Further information on the Lister-Blackstone Powr-Pak is contained in Bulletin 110, copies of which may be secured direct from the manufacturer by mentioning this magazine.

## Cut-Back Sprayers With Safety Control

The new Aeroil cut-back sprayers, which handle both asphalt cut-back and emulsion, have a special single unit safety control valve which makes it impossible to apply heat to the material at the same time pressure is applied to the tank.

The new single unit valve, with its four "stations" makes the operation of this sprayer very simple. Twisting the handle to "Spray" causes the compressor to put pressure on the tank, which is guarded against overload by a 60-pound safety valve. Venting of the fuel tank prevents use of the burner. When cleaning the tank the lever is moved to "Clean" and the compressor and air from the top of the tank blows out the hose lines. When filling, the lever is turned to "Fill" connecting the compressor to a separate drum pressure hose guarded by a 5-pound safety valve. Enough air is supplied to force the material from the drum to the spray tank, but never enough to blow the drum. When heating heavy materials before spraying the lever is turned to "Burner" and the compressor pumps up the fuel tank to 35 pounds and a safety valve keeps the pressure at that point. The spray tank is vented during this operation.

Once the machine is in operation, the man who holds the spray valve is in complete control. He can start or shut off the stream of bituminous material at will with the spray bar valve and the pop-off valve relieves the pressure on the line, as well as on the spray tank. The operator can also control the actual flow of materials with the spray bar valve. These new Aeroil cut-back sprayers are described and illustrated completely in catalog No. 190C, which may be secured from Aeroil Burner Co., Inc., West New York, N. J., by mentioning this item.

## Hydraulic Hand Jacks

The line of Blackhawk hydraulic service jacks in a variety of models and sizes to meet the requirements of garage and shop service is described and illustrated in a new catalog recently issued by the Blackhawk Mfg. Co., Dept. J18129, Milwaukee, Wis.

Copies of this Catalog No. 340 may be secured direct from the manufacturer.

## Pile-Driving Equipment

The Union line of pile-driving equipment, including Union patented double-acting pile-driving hammers, Type A and standard pile-driving hammers, sheeting hammers, pile-hammer hose, pile-driving leads and handling equipment, leads for marine work, pile-extracting rigs, and Lidgerwood-Union pile-driving hoists, is described and illustrated in a new bulletin recently issued by the Union Iron Works, P. O. Box 18, Elizabeth, N. J.

Copies of this Bulletin No. 184, which also contains diagrams and detailed specifications on Union pile-driving equipment, may be secured by interested contractors and engineers direct from the manufacturer.

*Direct from truck to form*
The Insley Readymix Receiving Bucket provides the fastest . . . most direct . . . most economical method where hoist equipment is being used . . . eliminates ramps and runways.

*Speeds up working schedule*
The bucket lies flat on the ground, takes entire Readymix batch. Readymix trucks are released immediately. One quick discharge and back to the plant for another load.

*Easy to handle*
One man can easily handle the Readymix Bucket when discharging the batch. On shallow floors hand spreading can be eliminated by swinging the bucket as the load is discharged.

Get the whole story. Write for Bulletin No. 144. Insley Manufacturing Corp., Indianapolis, Indiana.

INSLEY
Readymix Receiving Bucket

How STEVENS BATCHERS Reduce Costs for Contractors Everywhere . . .

EASY to Use in Close Quarters

One man with a Stevens Batcher can deliver a 700-pound load of bulk cement from the car to the working platform. Easy to push and maneuver . . . easy to dump with complete discharge. It will reduce your labor costs for years to come.

Write Today FOR DESCRIPTIVE FOLDER & PRICES

THE STEVENS METAL PRODUCTS CO.
NILES, OHIO

Warco Stability, COUNTS.

Continuous, uninterrupted performance for which WARCO Motor Graders are noted, is the result of the stability and ruggedness of the WARCO design.

*The full revolving circle permits operation of these new models either forward or backward. The 90° bank sloping angle enables operator to dig a ditch or slope a bank.*

*The new WARCO Models 101 and 105 have all the modern features which have been found necessary for modern road construction. Consult your distributor or write for literature.*

W. A. RIDDELL CORPORATION, Bucyrus, Ohio

One of the new Sterling self-priming centrifugal pumps.

## Economy Purchases Of Self-Prime Pumps

In addition to complying with all of the standards adopted by the Contractors' Pump Bureau of the Associated General Contractors of America, the Sterling Machinery Corp., 405 Southwest Blvd., Kansas City, Mo., has, in its decade of operation, developed certain features which it feels are particularly advantageous to owners of Sterling self-priming pumps. On all pumps, the self-cleaning pump cases are large enough to contain an extra large amount of priming water, permitting the pumps to operate satisfactorily under severest priming tests. On all 4-inch pumps and larger, the suction and discharge flanges are standard companion flanges.

There is a very small over-hang from the suction connection to the pump case, which aids the performance of these pumps. High efficiency is obtained by careful design of the impellers and volutes. The particularly long pass for the recirculation of the priming water permits rapid separation of the air from the priming water and the proper position of the priming jets.

The present line of Sterling self-priming pumps includes the standard 2, 3, 4, 6, 8 and 10-inch pumps, to which is being added a new line of light weight 1½, 2 and 3-inch pumps. Complete information regarding either of these lines may be secured direct from Sterling Machinery Corp.

## New Jaw Crushers

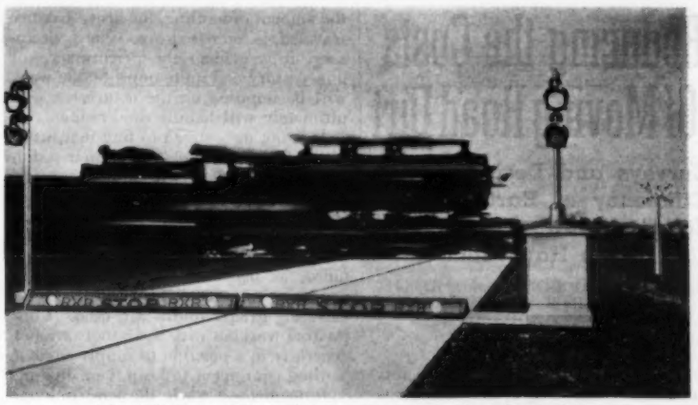
The new 24 x 36 jaw crushers made by Diamond Iron Works, Inc., Minneapolis, Minn., are designed for primary crushing in permanent plant installations, semi-portable plants and a wide range of portable plant applications. Diamond crusher jaws are made of high-grade manganese steel and are designed for reversing to get the maximum service life.

Features of these crushers include the long jaw design for economical production, product size control and long service life; special-purpose heavy-duty roller bearings; the Diamond safety toggle plates; positive lubrication, with all roller bearings individually greased by means of Alemite fittings; and sturdy and rigid construction.

Complete details on these Diamond jaw crushers may be secured by interested contractors and state and county highway engineers direct from the manufacturer by mentioning this item.

## Automatically Operated Grade Crossing Barrier

A barrier which rises from a position flush with the pavement to a height of 10¼ inches and displays red lights to highway traffic approaching a railroad crossing when a train is approaching has been developed by the Auto-Stop Division of Evans Products Co., Fullerton at Greenfield, Detroit, Mich. This Evans Electro-Pneumatic Auto-Stop is built in 7½ or 10-foot sections, so they can be grouped to secure the proper combinations for varying highway widths. The sections are set in concrete foundations on both sides of and approximately 100 feet from the track. They are built of structural and cast steel and are operated by the railroad train as it enters the track circuit, supplying flashing red lights within each barrier.



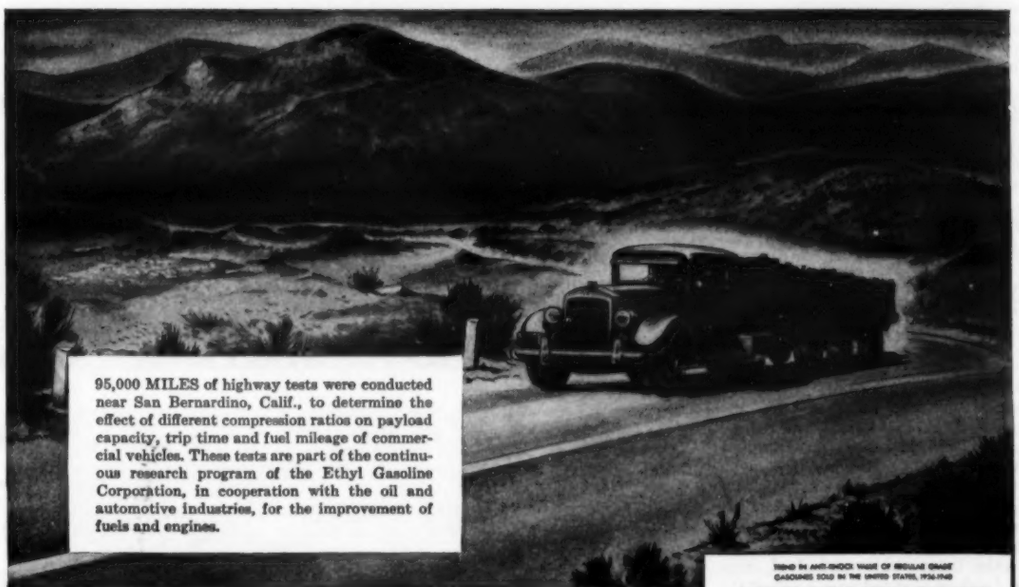
The Auto-Stop safety device for use at railroad grade crossings.

Already twenty-two Auto-Stop installations have been made and are now in operation on major highways in various parts of the country. They are also adaptable for use at bridges. Complete information may be secured direct from the manufacturer by mentioning this item.


WALKER BAR
No Drip!
★ FULL CIRCULATING SPRAY BAR for ALL ★
BITUMINOUS DISTRIBUTORS
Easy to Install
WRITE FOR CIRCULARS
THE EARL WALKER CO. INC.
SULLIVAN, ILLINOIS


# PAYLOAD POINTER

*Two-year tests show payload capacity of a truck greatly increases with more efficient use of fuel through higher compression ratios and correct ignition timing.*



95,000 MILES of highway tests were conducted near San Bernardino, Calif., to determine the effect of different compression ratios on payload capacity, trip time and fuel mileage of commercial vehicles. These tests are part of the continuous research program of the Ethyl Gasoline Corporation, in cooperation with the oil and automotive industries, for the improvement of fuels and engines.

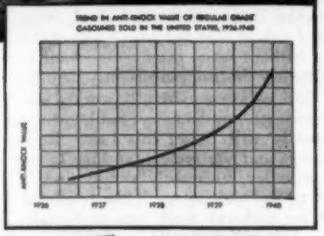
**THE TEST:** Original compression ratio of vehicle engine — 4.45 to 1. Higher compression ratio — 5.65 to 1. The use of the higher ratio was made possible by using fuel 8 octane numbers higher. Maximum power ignition timing was used with each ratio. The same carburetor jets were used in all tests.

**THE RESULTS:** With the high compression ratio, the truck hauled as much as 62% to 94% heavier payloads over comparable test routes, and used 4% to 7% less fuel. Trip times with both compression ratios were identical, and gross load with the high compression ratio approximated legal limits.

**THE POINTER:** The average rating of regular grade gasoline has increased from 60 octane number in 1930 to 73 octane number in 1939. This has permitted truck engine compression ratios to be increased from an average of 3.6 to 1 to 5.5 to 1. Equipment purchased a few years ago will generally have a compression ratio which does not take full advantage of today's greatly improved gasoline.

● These facts, and the well-established trend to better fuels, give fleet operators three opportunities to increase payload carrying capacities: 1. *In older vehicles,* to install high compression pistons or cylinder heads when engines are overhauled or rebuilt. 2. *In present vehicles with high compression engines,* to advance the spark as far toward maximum power as today's better gasoline will permit. 3. *In purchasing new equipment* by investigating the compression ratios available and specifying a ratio high enough to take full advantage of modern gasoline.

Increases in performance obtained in this way may also be used to reduce trip time or increase fuel mileage if heavier payloads are not desired or practical. Ethyl Gasoline Corporation, Chrysler Building, New York, N. Y., manufacturer of anti-knock fluids used by oil companies to improve gasoline.



**MAIL COUPON FOR TEST RESULTS BOOKLET**

Ethyl Gasoline Corporation, Chrysler Building, New York, N. Y.

Please send me a copy of "Results of Recent Road and Laboratory Tests on Commercial Engines" which gives complete data on the San Bernardino tests mentioned above.

Name_____

Address_____

C4E-4

# Reducing the Costs Of Moving Road Dirt

## Surveys and Design Aid in Efficiency of Earth Moving Jobs by Contract; Watch the "Free Haul" Item

By J. L. HARRISON, Senior Highway Engineer, Public Roads Administration

### Part I

✦ HANDLING earth work efficiently implies a great deal more than mere efficiency in a relatively simple construction operation. It involves the consideration and the correct solution of many design problems which, unless they are properly solved, will adversely affect the overall efficiency at which the work can be performed in the field. It also involves adequate preparation for such matters as the engineering supervision of construction.

There are several phases of efficiency in handling earth work: the phase usually discussed is the efficiency of performance, but one of the most important phases is the elimination of unnecessary and unproductive work; another is the reduction of friction on the job. The promotion of efficiency should begin back in the reconnaissance stage of the project and should be intensified in the survey stage. Efficiency is not a matter of avoiding work, but of avoiding *unnecessary* work. The elimination of unnecessary work in handling materials falls definitely on the drafting room.

Engineers realize that hauling costs money but the issue has been greatly confused by two widely different facts. The first of these is that specifications usually provide for some given "free haul" distance. Designs are quite generally based on the assumption that, as no disposition that is made of the spoil within the free-haul limits will affect the price that will have to be paid for the work done, any design that involves only a modest amount of overhaul is an efficient design.

This assumption can be defended readily on the rather substantial ground that, regardless of the actual amount of haul involved within the free-haul limits, contractors will bid about the prevailing market price anyway. That this is true cannot be seriously questioned, and the reason for it is a mystery. But to base design on this thought seems a rather shortsighted policy, for while it is a readily demonstrable fact that, in bidding, contractors do not differentiate between jobs on which the average haul is relatively short and those on which it is relatively long, studies which I have made do show that bid prices reflect the effect of haul when the average haul is consistently short or consistently long.

If designs are consistently worked out to eliminate unnecessary haul, prices eventually will reflect this fact. Both engineers and contractors, and the latter in particular, ultimately would find it much to their advantage if the free-haul limit on highway work was uniformly reduced to 100 feet. This would bring the matter of haul, as a factor in cost, and its importance in the efficiency with which earth work can be handled, into the open where everyone would be forced properly to evaluate its importance.

These comments serve to emphasize the fact that the movement of a given yardage of material, which we may assume is the minimum yardage necessary for the proper construction of a given highway, does not necessarily mean that no unnecessary work is being required. The most common error is a failure so to balance cuts and fills that the amount of haul is kept as low as possible. When the amount of hauling, the gross distance traveled, is increased over what is necessary, it is evident the performance of unnecessary and quite unprofitable work will be imposed on the contractor who ultimately will handle the grading.

It is not uncommon to find that, within the free-haul limits, the design as finally worked out results in a succession of long hauls and short hauls. Aside from whatever amount of extra haul could be eliminated by more careful design, wide differences in the haul distance, as between successive cuts, are expensive to execute if power shovels or elevating grader outfits are used. Contractors working with these tools are not generally in a position to supply enough hauling equipment to keep their digging equipment busy while the haul is long, and conversely cannot keep all of their hauling equipment busy when the distance is short. To enable the contractor to produce efficiently, the designing engineer must therefore avoid both unnecessary haul and unusually long haul. This can ordinarily be done without an undue amount of difficulty if the design engineer appreciates the importance of doing it. The attainment of a high degree of efficiency in handling earth work will require that more attention be given to this matter.

#### The Elimination of Friction

Friction covers conditions that tend to interfere with effective operations, without stopping them. Inadequate working space is a form of friction. In each state the shoulder-to-shoulder width of the roadway usually is a matter of fairly well standardized practice. Still, the width of the working space and its effect on the efficient operation of construction equipment often deserve consideration. The designing engineer should visualize the conditions likely to prevail during construction and, if he does so, will often find occasion seriously to ponder over whether a couple of feet of extra width of embankment can not be had without any substantial increase in cost for the reason that this extra width will facilitate the operation of the equipment likely to be used.

It is unnecessary more than to touch on specifications which on occasion tend to retard production. The modern tendency is to get rid of provisions which have this effect unless they serve some clearly useful purpose, and if they do, then revise them so as to preserve the good there is in them but to eliminate their tendency to restrict output unnecessarily. A typical illustration is found in the requirement, used in several states, that road rollers, while rolling fills, shall operate in low gear. I know of no reason, either practical or theoretical, for such a specification, and strongly suspect it of being the result of imagination rather than of reason or test. Efficiency demands that unless a requirement found in the specifications is definitely useful, it be eliminated.

#### The Inspector's Contribution

Once construction starts, the engineering oversight of it should, as far as possible, be constructive and helpful. The day of feeling that a high rate of production is in necessary conflict with a high quality of performance has passed. It is quite as possible for good management to take care of quality as it is of quantity. Normally, the two go together. The vigor, the drive and the administrative capacity that are required to build an organization that will deliver quantity finds no difficulty in equally delivering quality. The lack of these attributes in the management is all but certain to affect quantity quite as much as it affects quality. Today's engineering direction of construction recognizes these fundamentals and, accordingly, seeks ways in which to maintain quality without obstructing the contractor's efforts to secure quantity.

(*Part II will appear in the May issue*)

CONTRACTORS BARROWS
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Type M-11

*The only barrow with tray having double folded corners and three thicknesses of steel at folds, and non-leakable*

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*Write for Catalog 40C*

JACKSON MANUFACTURING COMPANY, HARRISBURG, PENNSYLVANIA

Viewed From ANY ANGLE

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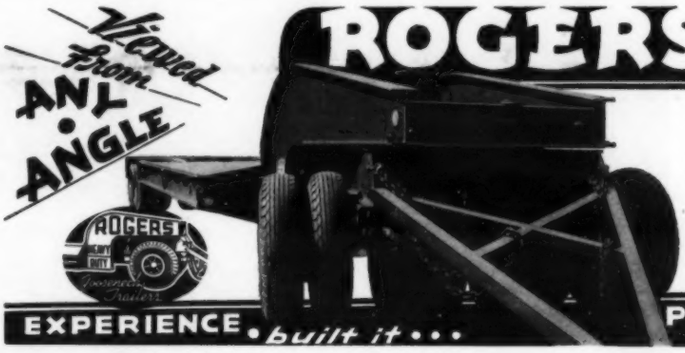

reveal excellency based on years of specialized experience.

Walk around it. View it from every angle. You'll likely find yourself admiring what is obviously outstanding design and correct construction.

Back of this, of course, is a long career of specialized activity, unequalled by any heavy duty trailer organization anywhere in the world.

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The complete line of Heil Road Machinery includes: Hydraulic Scoops, Cable Scoops, Two Wheel Scoops, Trailbuilders, Bulldozers, Tamping Rollers—Send for free catalog.

The new Toro patching roller.

## New Patching Roller

A miniature tandem roller which was developed originally for rolling tennis courts at the University of Minnesota has been rapidly accepted by state and county highway departments and many contractors for patching as well as for rolling driveways, parking lots and filling stations, or bituminous surfacing.

The Toro power roller made by Toro Mfg. Corp., Minneapolis, Minn., weighs 1,327 pounds gross when the 14¾-gallon water tank is filled and the machine is driven by an average-size operator. The roller is powered with a Toro 3-hp air-cooled 4-cycle motor with an automatic built-in governor and a counterbalanced ball-bearing crankshaft. It has a forward and reverse transmission with ample speed range both ways. The wheelbase between the axle centers is only 27¾ inches, making it possible to get the roller in and out of small garages, around curb stones and manholes and makes it easy to load and unload. The front roller is 12 inches in diameter and the rear roller 17½. They are both built of gray iron, machined to accurate measurements and mounted on ball bearings.

Complete information regarding this roller may be secured direct from the manufacturer by mentioning this item.

## New Synthetic Coating For Conveyor Belting

Conveyor installations on which conveyor belting is used are often idle for considerable periods. During this idleness, the belting covers may suffer greater deterioration through the effects of sunlight and air than when the belting is in use. This deterioration also takes place when belts are in storage.

After considerable research, the B. F. Goodrich Co., Akron, Ohio, has developed a new synthetic coating for belting covers which, on the basis of its tests, should greatly reduce the effects of aging. Samples of belting with covers under severe tension were coated with this synthetic composition and exposed for six months to all varieties of weather. At the end of that period none of the samples of belting on which the new coating had been applied showed any evidence of cover deterioration.

Further information on this coating, designated as Goodrich R-60-T protective coating for conveyor belting, may be secured direct from the B. F. Goodrich Co. by mentioning CONTRACTORS AND ENGINEERS MONTHLY.

Do you wish a really superior dumping unit for handling 2-cu. yd. Detachable Buckets?
SEE OUR MODEL LF
(Load Forward)
DEMPSTER DUMPSTER
For any 1½-ton truck
NO COUNTERWEIGHT OVERHANG SIDEWAY
All the load on the chassis
DEMPSTER BROS. INC. Knoxville, Tenn.

## Three Road Machines Make County Outfit

(*Photo on page 44*)

R. L. Schoenberger, Superintendent of Highways for Bureau County, Ill., has made three pieces of highway equipment into an efficient road-building or reconstructing outfit. With a Caterpillar D7 tractor pulling an 8-yard Carryall, and a Caterpillar No. 12 motor grader, Mr. Schoenberger finds that he can reconstruct an old gravel road or build a new earth road from start to finish.

The tractor and scraper make small cuts and fills, smooth low banks, and do similar tasks, while the grader does the finishing, cuts steep banks, digs ditches, etc. In reconstruction, Mr. Schoenberger reports the combination to have saved considerable money, especially where the old road still had a fair amount of gravel on it. The tractor and scraper scoop up the old gravel and store it at the end of each section of work, or the grader stores it in a center ridge. The grader then goes to work on the rebuilding job. Next the tractor and scraper load up the gravel, bring it back into position, and the motor grader does the final spreading.

## New Pipe Tool Catalog

One of the line of Beaver pipe tools described and illustrated in the new Catalog 40 is the No. 71 pipe and bolt threader, for threading pipe from ⅛ to ¾-inch, and bolts from ¼ to 1-inch, right or left hand. Other pipe tools included in the Beaver line are pipe cutters, reamers, sawing vises, various types of threaders, pipe and bolt machines, and accessories.

Copies of this new catalog on the 1940 line of Beaver pipe tools may be secured direct from Beaver Pipe Tools, Inc., Warren, Ohio, by mentioning this item.

Joint Installers
Finishing Machines
They have the necessary weight, speed, stamina and precision to insure profit.
FLEXIBLE ROAD JOINT MACHINE CO.
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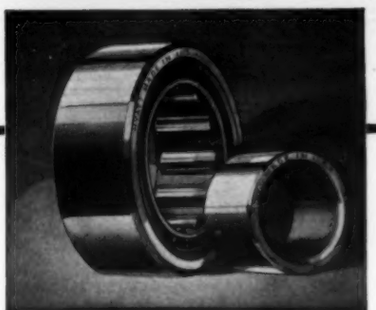
ALWAYS READY FOR ACTION
WHEREVER THESE BETTER BEARINGS SERVE



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**GENERAL POWER SHOVEL** built by The General Excavator Company. With its Hyatt equipment there is never time out on account of bearing wear or care.

*At all times of the year,* day or night, you can be assured that Hyattized equipment will carry through. Weather conditions, heavy loads, shocks, long hours or extreme speeds make no difference to Hyatt Roller Bearings. They have the staying power to keep equipment going, to prolong machine life.

You'll find Hyatt-protected machinery everywhere always ready for action. Hyatt Bearings Division, General Motors Sales Corporation, Harrison, New Jersey; Chicago, Pittsburgh, Detroit and San Francisco.

# New Bridge Built At Waterloo, Iowa

(*Continued from page 2*)

blasting in any of the excavation because of the possibility of shattering the rock and developing faults. All the rock excavation was done with hand tools and a jackhammer.

The steel sheet piling for the cofferdam was driven in 22 to 24-foot lengths, using Bethlehem sections driven to penetration with a McKiernan-Terry No. 7 steam hammer. One set of 12-inch H-beam wales was lowered to 4 to 5 feet above the final depth of driving, at about stream bed elevation, and an additional set of 12 x 12-inch timber wales set at the top. The rock was so hard that the ends of the sheet piles were badly sprung, resulting in considerable trouble with leakage at the contact with the rock. Finally a satisfactory seal was effected with cinders, but where the leaks were really bad the driving was continued until pouring of the footing was started.

The equipment for handling the sheet pile driving of the 14 x 70-foot cofferdams consisted of two wooden barges lashed together and carrying a steel derrick with an 84-foot boom, a boiler and a steam hoist. This was held together by a pair of 16 x 16-inch timbers at the front but the early work required that this be reinforced by steel I-beams.

The cofferdam was pumped out with CMC pumps, using two 4-inch and an 8-inch pump at the start and then two 4-inch pumps and a 6-inch unit, keeping one of the pumps as an auxiliary. The excavation was carried about 4½ feet into the rock of the stream bed or a total depth of 7½ feet, all to the neat line of the footing which measured 3 feet deep x 7 feet 9 inches and 65 feet 6 inches. On Pier 3, the anchor pier, the footing was 2 feet wider but the same length. An air compressor mounted on the south bank of the river supplied air for the jackhammers by pipe line.

The concrete for the footings was supplied by C. W. Shirey, a local ready-mixed concrete producer, and was delivered in Blaw-Knox truck mixers. These unloaded to 63-cubic foot Blaw-Knox roller-gate concrete buckets and two smaller sliding-gate buckets. These were swung by the barge derrick for Pier 2 but later, for the other piers, the buckets were shuttled back and forth on a small barge, carrying 5 cubic yards of concrete per trip. The concrete was poured with elephant-trunk spouts for both the footings and the piers.

The contractor was paid for excavation 1½ feet outside the footings to the cofferdam and this space was used as a drainage channel to sumps so that the water was always kept down during the pours. During the excavation against the sheet piling several bad leaks developed, but all were licked by further driving of sheeting and with cinders and adequate pumping.

The footings were reinforced with cross bars of ¾-inch round steel hooked at the ends and spaced 6 inches on centers, and also with longitudinal bars of ⅝-inch round steel spaced 12 inches on centers. Dowels to key the pier to the footing were placed on about 12-inch centers all around the face of the pier and extended about 3 feet into the pier. These provided a 50-diameter lap for the pier reinforcing.

### The Piers and Forms

The cutaway-type round-nose pier was used on this structure, with a center pilaster. The ends and sides of the noses and the pilaster were battered ½ inch per foot with a uniform 2-foot thick diaphragm giving a pleasing appearance to the piers. The base of Pier 2 is 5 feet 5¾ inches wide at the footing and 4 feet wide at the top or cap. The four

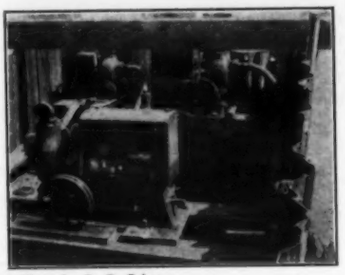

*Photo by R. E. Tabor*

**Three CMC pumps used to dewater the Pier 2 cofferdam.**

grooves mentioned for decorative effect in the cap are 1 inch deep and 1½ inch wide beveled so as to make the removal of the form strip easy. As a matter of fact the removal of the strip was not easy in any of the grooves even with the strips very well greased. On the first strips it was thought that the nailing was not sufficiently secure and hence the toe nailing was increased. This only resulted in making it harder to remove the forms so in later installations the strips were permitted to come off the forms and then taken out separately.

One complete set of forms was all that was needed for the pours for the complete set of piers. As Pier 2 was the shortest in height the forms were made to fit that pier and then the added height was made up with short lifts at the bottom as required. As these were all below water level, the slight form marks at the junction were covered in the final structure. The forms were all lined with ¼-inch waterproof plywood and, with only slight repairs, went through the entire pouring satisfactorily. The tie rods were furnished by Superior Concrete Accessories, Inc., of Chicago. The form lumber was ¾-inch x 8 and 10-inch boards in the footings and all 8-inch boards in the piers. The pier forms were divided into two nose sections, two combination inside nose and diaphragm sections, two sections for part of the diaphragms and the center pilaster section, making twelve sections for the pier. Double 2 x 6-inch wales were used with the ties and vertical studs doubled at the splices.

The piers were poured as a monolith from the footings up to and including the copings. These measured 4 feet side, 61 feet 8 inches long and 3 feet 3 inches high for the pier described. Pier 2 contained a total of 185.2 cubic yards of concrete of which 56.4 cubic yards is in the footing. The form work was neat, resulting in excellent surfaces which required the minimum of hand rubbing with Carborundum stones. No final rubbing was done until the deck had been poured. All the concrete was vibrated with electric and hydraulic vibrators throughout and no honeycomb was evident.

### Steel Erection

The erection of the steel of the superstructure was done by Bethlehem Steel Co., which furnished the steel, and was done under the direction of E. V. Campbell, Erection Superintendent. The Rock Island Railroad ran a spur track from its own lines to the south end of the structure so that it could be continued across the bridge as construction continued and thereby deliver the steel direct to the erection traveler without rehandling.

The most unusual feature of the erection was the use of the last two girders for the northeast end with the complete floor structure as the traveler for the steel erection derrick. This was mounted crosswise on top of the center and downstream girders on railroad rails which were well greased to permit easy sliding. A special shoe was made to fit over the rails for sliding and when in use the whole was lashed to the completed structure. This "jigger stick" with the 90-foot steel mast and 80-foot steel boom, girders and floor system, cable and accessories weighed about 90 tons and is believed to be about the largest weight skidded in this manner on bridge erection. The rails on which the jigger stick was moved were laid on the tops of the girders and not clamped or otherwise attached to the girders.

The steel falsework bent consisting of six 12-inch H beams was driven 5 feet back of the splice of the cantilevered girder and the suspended span. Each

(*Concluded on next page*)


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CONTRACTORS' SUPPLY DEALERS in every state sell the Fulton line. Specify SHURE-DRY and FULTEX Tents, Tarpaulins, and Windbreaks—anything made of canvas. Also Fulco Road Mats and Burlap. Fulton products are good and their prices are right.

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Bulletin K34 gives sizes and specifications on electric and gasoline hoists.

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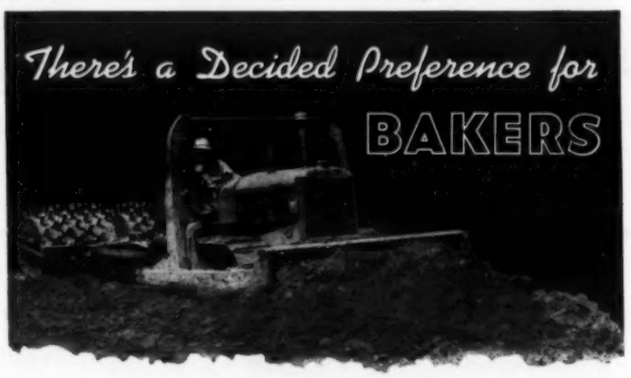


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Bakers dig at a constant, flat angle, regardless of the depth of cut. That's why they require far less power to fill to capacity and leave your grade smooth, with no unsightly holes or waves. Three sizes in 2-wheel models—3, 5 and 6 cu. yd. capacities for any make tractor.

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**585 Stanford Ave., Springfield, Illinois**

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# Novel Steel Erection For Waterloo Bridge

*(Continued from preceding page)*

pier has a 67-foot cantilever both ways and a center or suspended section 67½ feet long. The 3-girder system permitted the use of the center and downstream girders for the working system and the setting of the upstream girder as an independent unit. The falsework was not used for the upstream girders.

### Another "First" in Steel Erection

When the setting of the center and downstream girders had proceeded as far as Pier 3 and the traveler skidded to a position 42 feet back of Pier 3 on the falsework bent, the upstream floor beam was set, making the connection at the pier, and held in position by blocking. Before the girder could be set and it was sure that it would be held firmly, the 67-foot 6-inch downstream girder was set on a 45-degree angle across the downstream and center girders cantilevered to take care of the forward end of the upstream girder centering at Pier 3. This was blocked and lashed to the downstream girder and the center girders, using ¾-inch steel wire rope. Then the upstream girder, centered at Pier 3, was set and blocked and lashed to the diagonal girder. As the center girder was 4 inches higher than the up or downstream girders the upstream end of the diagonal girder was 8 inches high and had to have an 8-inch filler block between it and the upstream girder which it was being used to secure at the forward end. This made the upstream girder rest level as required so that it was then possible to go back and set the upstream intermediate or suspended girder between the cantilevered ends of the girders centered on Piers 2 and 3.

The derrick for the erection of the steel was operated by a 2-drum Mead-Morrison electric hoist on shore. The time required to lift a girder from a car, raise the boom to vertical to clear the guy ropes, turn the derrick to the proper position, and lower was about 30 minutes. The skidding hoist was a 2-drum Lambert which was also used to move the cars with the steel. The reeving for the cable to move the 90-ton traveler or jigger stick was somewhat complicated to get the required 6-part line for the needed power. The line went out along the downstream girder to a forward sheave, then back to a sheave attached to the back of the traveler centered at the back, then forward to a sheave at the forward end of the part resting on the center girder, back to the rear of the traveler on that side and forward and back again, being finally attached at the end at the back of the traveler, giving the 6-part line needed. All cable fastenings were made with a suitable number of Crosby clips.

As the work progressed the H-beam erection bents were pulled and driven ahead.

### Neat Rig for Pulling Sheet Piles

A simple and effective rig for pulling the sheet piles in the cofferdams was used by the general contractor, A. Guthrie & Co. of St. Paul, Minn. A stick of two 9 x 18-inch timbers bolted together and shod at the bottom with a heavy plate which formed a notch so that the stick could fit over a sheet pile was set up over the pile adjacent to the one to be pulled. Then, with a 4-part line attached to the drum on the barge, a steady pull was exerted and all the way from one to four sheet piles would come up. The bearing against the single pile was sufficient to provide the resistance for the pull and the interlocking of one or more piles because the ends had curled by hard driving to get a water-tight bearing on the rock, caused them to come up in groups.

### Personnel

The general contract for the construction of the new steel and concrete bridge over the Cedar River at Waterloo, Iowa, was awarded to A. Guthrie & Co. of St. Paul, Minn., on its low bid of $203,797.00. W. R. Howard was Superintendent for the general contractor and E. V. Campbell, Superintendent for the Bethlehem Steel Co., the subcontractor on steel erection. For the State Highway Commission, R. H. Avenell was Resident Engineer.

## Better Paving Formulae Available to Officials

A service, invaluable to road officials and engineers in the territory served by The Ohio Oil Co., has been set forth in a 58-page pamphlet on Lincolnite, a low-price pavement. The Asphalt Division of The Ohio Oil Co., Inc., Robinson, Ill., furnishes to road officials and engineers analyses of aggregates sent to its laboratory and determines the best combination to give the proper gradation and paving mix formulae. This service is available to county, town and municipal officials and engineers who may be interested in this information. This same group may secure copies of the literature mentioned above by writing direct to the company, requesting a copy of its Lincolnite booklet and mentioning this item.

## Speed in Hauling

This is the title of a 16-page bulletin on the line of Athey Forged-Trak track-type wagons for large dirt-moving jobs. The recent improvements in this type of dirt-moving units plus the increase in speeds of track-type tractors and the reduction in tractor fuel costs have resulted in increased efficiency in these units, according to the manufacturer.

Copies of this bulletin "Speed in Hauling" may be secured by interested contractors and engineers direct from the Athey Truss Wheel Co., 5631 West 65th St., Chicago, Ill.

GATKE Moulded Asbestos Brake Blocks and Clutch Frictions really stand out on tough jobs.

Heavy loads and hard service quickly demonstrate their great holding power and uniformly smooth action at all service temperatures.

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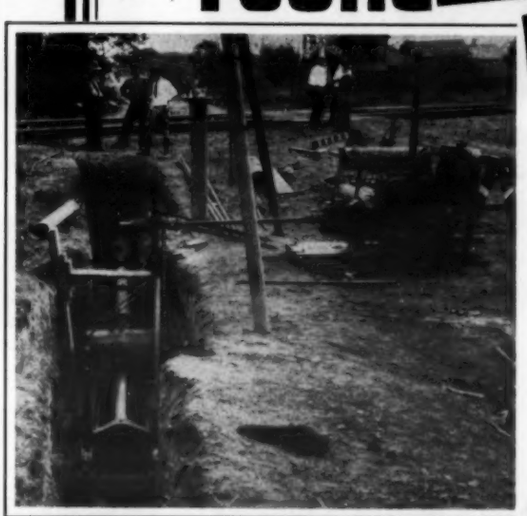

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Power transmission is thru an easily adjustable counter shaft from the power unit which stands along side the ditch. This allows quick set-up on the job. Only the Boring Machine sets in the ditch. The first section of the pipe carries the cutter head and when the bore is complete, the pipe remains in the hole. Backfilling is eliminated.

The practical usefulness and remarkable economy of this machine has been proved on hundreds of jobs. It is ready to go to work on your very next pipeline job. You can either buy or rent the machine you need. The savings in labor and expense will pay for it.

*Send for Bulletin No. 15-E*

The Young Boring Machine installs casings for water lines, gas and oil lines, sewers, conduits, etc. under highways and railroads or through embankments.

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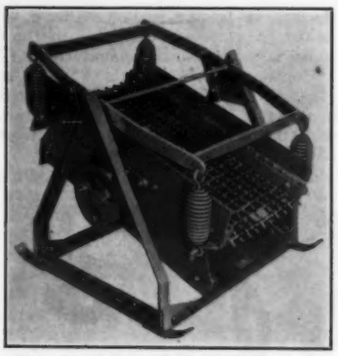


The new Robins small double-deck vibrating screen.

## New Portable Screen Has Many Features

A small portable, double-deck vibrating screen that will separate crushed stone, gravel or sand into three sizes at about 100 tons per day, has been announced by Robins Conveying Belt Co., 15 Park Row, New York City. This inexpensive unit is driven at 1,000-rpm by a 2-hp gasoline engine or a 1-hp electric motor. The screening surface is 16 inches wide and 36 inches long and the total weight of the screen proper is less than 400 pounds.

This contractor's screen is particularly useful for roadside construction plants, building construction, separation of sand for concrete blocks, bridge abutments, foundations, or other concrete work. The total cost of operation and maintenance, including interest, investment and depreciation, according to the manufacturer, is less than ¾-cent per ton of material.

More complete information regarding the Robins contracting screen may be secured direct from the manufacturer by mentioning this descriptive text.

## Mobile Motor Clinic Fosters Motor Tune-Up

More than 3,000,000 cars were spurred to greater efficiency last year by motor tune-up service offered by garages and independent shops, according to a recent survey by the Ethyl Gasoline Corp. As a result, utilization of vast stores of latent power has been accomplished through closer team-work between engines and fuels. With recent improvements in gasoline offered by the oil companies the car owner can get greater value for his gasoline dollars by tuning the motor to take advantage of these better fuels, John G. Martin, National Director of the Ethyl motor clinics, states.

Motor tune-up years ago was merely a matter of repairs to keep the car running, but as engines and fuels were improved, it was realized that tune-up was becoming an adjustment of parts to achieve better cooperation of motor and fuel for maximum performance. For this reason the Ethyl motor clinic program was founded. The eleven portable clinics now operating, each of which constitutes an indoor proving ground for automobile performance and fuel efficiency, will function in nearly 100 cities during 1940. Each clinic has 12 tons of equipment seldom seen outside a laboratory and is staffed by five engineers. In each clinic center, from one to four meetings are scheduled daily for various automotive service groups. The climax of the clinic assembly is an automobile road test on the stage. A driver thrusts the accelerator to the floorboards and the rear wheels spin up to 60 or 70 miles an hour on a power tester as the car goes nowhere. As the car is operated at various loads, duplicating its action on different types of highway grades, an engineer demonstrates the variations in speed and power output obtained with improper and proper motor tune-ups.

"Engine design has kept pace with fuel progress, but car performance has lagged through failure to adjust motors to improved gasoline," Mr. Martin said in outlining the development of the clinics. "During the present year we are looking forward to still greater progress in schooling not only car owners but oil company personnel and automobile agency workers in the interlocking practices of the petroleum and the automotive industries. The interdependence of fuels and car operation must be universally understood before the full possibilities of the motor vehicle can be understood."

## Penn Stages Show; Has 2,500 Visitors

The showroom of the H. O. Penn Machinery Co., 140th St. & East River, New York City, was the scene of one of the largest independent construction equipment shows ever staged, on February 21, 1940. More than 2,500 invited guests, including city, county and state highway officials, engineers, contractors and manufacturers' representatives, filled the 25,000 square feet of show room and packed the 350-seat auditorium where there was a continuous showing of "feature" sound films of Caterpillar equipment at work.

Members of the Penn organization acting as hosts included H. O. Penn, Jack Frost, Ralph Johnson, Stu Wade, Art Ketcham, Bruff Olin, Guy Berger, Pete Ruggles and Harriet Plotkin.

The manufacturers represented by executives at this Show included the Caterpillar Tractor Co., R. G. LeTourneau, Inc., T. L. Smith Co., Link-Belt Speeder Corp., Foote Co., LaPlant-Choate Mfg. Co., Marion Steam Shovel Co., Marlow Pumps, Le Roi Co., and the John Deere Tractor Co. In addition to these companies, the H. O. Penn Machinery Co., established in 1921, acts as exclusive territorial representative for Athey wagons, Huber rollers, Heltzel bins and forms, Beach saw rigs, Owen buckets and Frink snow plows.

## Winner of Mack Contest At A.R.B.A. Road Show

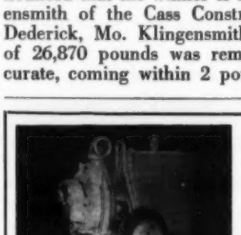
No less than 6,500 delegates to the 1940 A.R.B.A. Road Show entered the weight-estimating contest conducted at the exhibit of Mack Trucks, Inc., Long Island City, N. Y. The object of this contest was to determine the exact weight of a load of crushed rock carried by a Mack Model FJ diesel truck which was a feature of the exhibit.

After checking the many entries filed by the contestants, Mack Trucks has announced that the winner is L. E. Klingensmith of the Cass Construction Co., Dederick, Mo. Klingensmith's estimate of 26,870 pounds was remarkably accurate, coming within 2 pounds of the actual weight of 26,868 pounds. As a prize for winning this contest, Klingensmith will receive a set of four passenger-car tires of whatever make and sizes he requires.

## Bucket Loaders

Contractors and state and county highway engineers with material-handling problems in gravel pits and similar locations will be interested in a new 12-page catalog on Nelson bucket loaders. The Model Q-7 is a heavy digging loader, strongly built and amply powered for excavation from solid ground, while the P-7 is designed for maintenance work or other jobs where the loader must be moved from point to point. There are also the L-4 for stockpile work and the L-40, similar to the P-7 but lighter in weight and designed for less severe service.

Copies of this catalog may be secured by those interested direct from the N. P. Nelson Iron Works, Inc., 822 Bloomfield Ave., Passaic, N. J.

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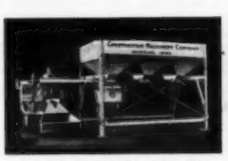

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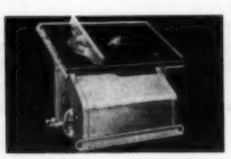

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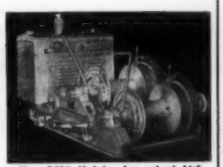

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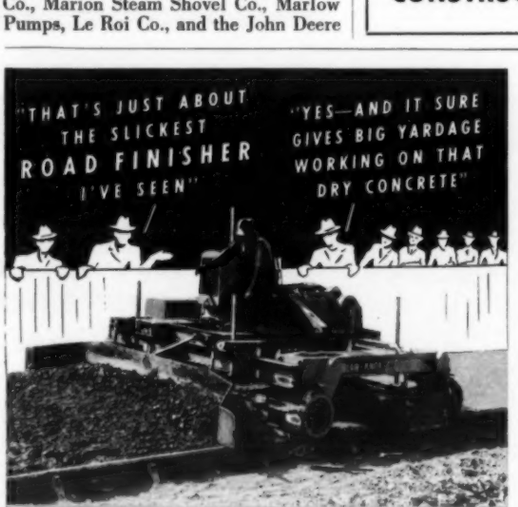


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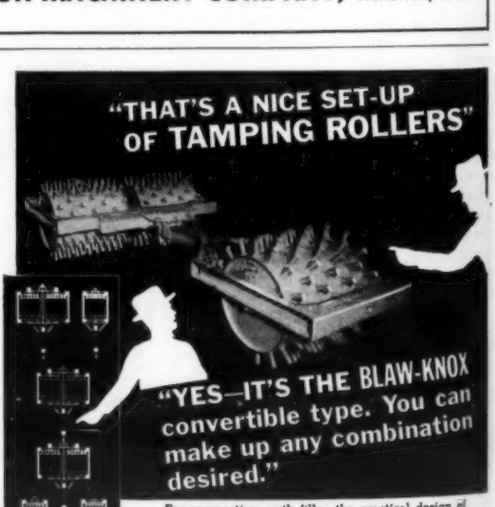


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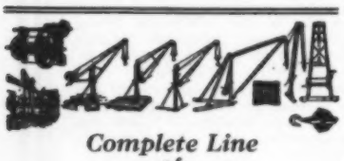

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# Avoid Legal Pitfalls

*These brief abstracts of court decisions may aid you. Local ordinances or state laws may alter conditions in your community. If in doubt consult your own attorney.*

Edited by A. L. H. STREET, Attorney-at-Law.

## Subterranean Obstructions On Excavating Contracts

If any one thinks that slot machines and dog races are the principal species of gambling ventures where vast sums of money are lost, let him take a casual glance through the law reports. He will be amazed at the large and increasing number of cases where sewer and other excavating contractors have gambled on normal soil conditions—and lost.

Take, for example, the recent case of O'Neill Construction Co. v. City of Philadelphia, 6 Atl. 2d, 525. There the plantiff bid on a sewer contract and banked on the city's plans, which indicated that test borings had been made along the center line of the site. Actually, the borings had been made several feet to one side of the center. The contractor unexpectedly encountered a mass of cribbing buried below the surface and not shown by the plans. Suit was brought to recover pay for the extra work involved.

The Pennsylvania Supreme Court decided that there were several reasons why the contractor must stand the loss. First, contractors assume such risks, unless their contracts are plainly worded to the contrary, and this contract was not so worded. Second, under the contract and standard specifications the borings were made for the city's own use and the contractor relied on them at his own risk. Third, the specifications provided that correctness of the plans as to borings shown by them was not guaranteed. Fourth, representation by the city on the plans that the borings were made along the center line of the sewer site did not render the city liable, because it did not appear that the *soil* conditions were different where the borings actually were made. Fifth, if the city knew of the existence of cribbing, it was not bound to pass the information on to the contractor, because the bidding specifications provided: "Bidders must examine the location of the proposed work and make themselves acquainted with the conditions on the ground and the character of material to be encountered."

The decision, however, appears to have been influenced by a determination, from the facts of the case, that the city's employees had not intended to mislead bidders as to actual subsoil conditions.

## Owner Stuck for Loss

"Ordinarily a contractor is not responsible for defects caused by acts or orders of the owner during the progress of the work," declared the Pennsylvania Supreme Court in the case of Manella v. City of Pittsburgh, 6 Atl. 2d, 70. The court applied the rule to this state of facts:

A contract to lay a 36-inch water pipe across the bed of the Monongahela River at Pittsburgh permitted the city to require draining of the pipe for the purpose of inspecting the line. After the pipe had been laid, but before the trench for the pipe had been backfilled, the city, over the contractor's protest, required him to drain the pipe. The pipe floated, buckled at the flanges and broke. It cost nearly $30,000 to repair the work. Although the city resisted suit to recover this item, the contractor won.

The Supreme Court decided that even if the contract permitted the city to require dewatering of the pipe for an inspection, the requirement was made prematurely and at an improper time. Therefore, the city must stand the resulting loss. The court said that there was nothing about the contract to indicate that the dewatering properly could be demanded except immediately before final approval and taking over of the line, after the trench had been backfilled.

To the city's contention that the repair work constituted extras for which the contractor could not recover, because no claim was filed with the engineers within the time required by the contract, the court said: "The repairs did not represent extras in the sense of the work not contemplated in the plans and specifications, but additional labor and material necessary, by reason of defendant's act, to complete the job in accordance with *original* plans and specifications."

## Classifying Materials

Much of the litigation that rises out of construction contracts is caused by one fault commonly committed by both contractors and engineers in the wording of bids, specifications and agreements. The fault is the omission to indicate clearly how various materials shall be classified, where the contractor is to be paid on a unit basis.

Take, for example, the recent case of Creech Bros. Contracting Co. v. Pacific County, 93 Pac. 2d, 292, decided by the Washington Supreme Court. The county furnished all the lumber and the contractor furnished all the labor required for the building of a bridge. The contract provided that the contractor should be paid $16 per thousand for "trestle" lumber in place and $40 per thousand for "truss" lumber in place. Had the contract specified to which of these two classifications the decking, including stringers, of the bridge should belong, two lawyers might have been unemployed for the time that it takes to dispose of a lawsuit.

But the contract was silent on that point and it took a decision of the highest court of the state to settle the matter. The court solved the dispute by considering two factors: first, the estimated quantity of truss lumber was so small, as compared with the estimated quantity of trestle lumber, that when the plans were checked, the contractor should have known that the decking and stringers fell within the latter classification. Second, the labor in laying the decking, including stringers, was work that would proceed more quickly than the truss construction and therefore, presumably, would be mutually intended to be paid for at the lower unit price provided for trestle construction.

Moral: A drop of ink spread out on a contract may save a lot of money.

## How to Lose Money

Not even the Lone Ranger could get this Mississippi highway subcontractor out of the hole into which he had placed himself. Ole man Law said: "I won't help any one collect on an illegal contract."

It was this way: the subcontractor worked his men overtime on a Federal-Aid project, paying them overtime. He knew that this violated Uncle Sam's rules on the subject—rules designed to spread employment as far as possible amongst the unemployed. So he reported to the state highway department only so much labor as was within the law. The contractor promised to make up the difference, but later on evidently decided that it was his patriotic duty not to keep the promise. The poor old subcontractor not only lost what he paid out for overtime, but the cost of a lawsuit. Said the Mississippi Supreme Court in the case of Chas. Weaver & Co. v. Phares, 188 So. 12:

"The overtime employment was contrary to a definite and distinct public policy as regards such Federal-Aid work, and anything expended by" the subcontractor "in direct furtherance of that overtime employment was an expense against the law. In seeking to recover that expense, even as against a third party who subsequently promised reimbursement therefor and even though the third party had known of the illegal acts and had acquiesced in them at the time committed," the subcontractor "is obliged to base his effort, so to recover, upon his original unlawful action. If the courts were to aid in this effort, it would be to sanction and to legalize that which was unlawful, and this no court will do."

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# Work in Clay Heading On Mass. Sewer Job

(*Continued from page 2*)

surface and dumped into a hopper for loading to trucks. The skips were handled by a Marion crawler crane which was later moved to the open-cut operation, when the skips were handled by the stiffleg derrick until the overhead frame was built for the handling of the tunnel cars. By the time the shaft reached its full depth, the three pumps were delivering 3,000,000 gallons daily to a welded-steel discharge line leading to a city sewer about a city block away.

The rangers for the sheet piling in the shaft were 10, 16 and 24-inch WF beams with diagonal braces at the corners. On one of these braces an Ingersoll-Rand Tugger air hoist was located and used for the handling of the wells as they were installed and lowered in the shaft. While not used after that work, it was left in position for possible emergency work.

### The Head Frame

The temporary equipment used when the shaft was excavated was replaced by a heavy structural-steel head frame when work in the two headings was well underway. The frame carries two material cages independently raised and lowered by single-drum Mundy hoists driven by 30-hp G-E slip-ring motors. The cages are each large enough to handle a single car which, when raised to the platform 20 feet above the street, is pushed out by hand to the car dumpers which are small editions of the huge air car rotary dumpers used on the Great Lakes. These small units are rotated by a single-cable drive from I-R air motors. Each muck car has a 3 x 3-inch angle welded along each side which fits loosely in a similar angle welded inside the car dumper, so that when the dumper is rotated the car is held firmly in position by friction and gravity while the muck is being dumped. To permit free dumping a handful of sawdust is thrown into the car before it is returned down the shaft.

The platform at dumping level has two through tracks extending from one end to the other through the cages and to the dumper. In addition, two other outside tracks are used for storage and for loading materials. In order to permit ready moving of cars above the platform, two shuttle tracks were built at right angles to the four longitudinal tracks. On each of these one shuttle with a section of track is operated. In order to spot these quickly and latch them in position a special latch was devised and installed.

### The Clay Heading

The 11-foot 3-inch inside diameter circular sewer is being driven in clay with liner plates and 8-inch I-beam braces curved to fit the perimeter and spaced 32 inches on centers under the streets but on 16-inch centers under heavy crossing and railroads. The cover runs from 60 feet to as little as 14 feet.

At the start of the work in the clay heading the number of rings completed per day was 2, 7, 8, 10 and 11 on successive days, showing the progress in organizing the work. As the work progressed there were many days when 20 rings were completed. There are fourteen plates and a one-quarter key plate for each ring. The plates measure 16 inches wide and ¼-inch thick. The I-beam rib is in five equal segments, weighing 170 pounds per segment.

The contractor assembled a jumbo of Jeffrey parts under which four of the five Easton industrial railway cars could be run. The jumbo carries the Watson-Stillman hydraulic pump for the twelve 60-ton shield jacks, the Union grouting machine and the gravel packing machine

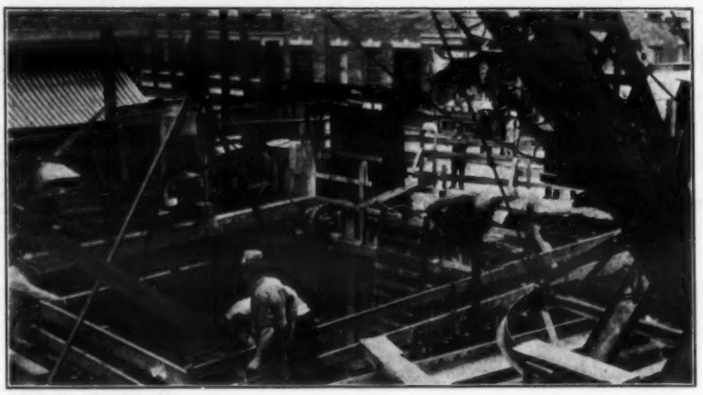


*Photo by Chet Orlowski*

**The shaft on the Silas Mason contract, showing the steel sheeting and floodlights.**

which the contractor designed and built to fit the conditions of this tunnel. Each ring of liner plates as completed is held to true circular form by 1¼-inch tie rods with turnbuckles made by the contractor in his own shop located only a half block from the shaft.

The tunnel is well lighted, and the lighting of the heading is unusually good. Two 100-watt vapor-proof lights are used immediately against the heading and two 50-watt lights on the platform. Back of the shield are two Wheeler reflectors with 500-watt lights in each.

The jumbo carries a belt conveyor for moving the muck from the back of the shield over the cars that are under the jumbo and into the car being loaded. A pair of battery-operated Mancha locomotives are used for moving the cars from the jumbo to the shaft. The locomotive batteries are charged in the tunnel, being lifted from the locomotive by a 1-ton Yale hoist attached to an H-beam set across the liner plates near the top of the ring. The batteries are set on wooden cribbing at either side of the track during charging.

Silas Mason, Inc., is using the following organization for the clay heading and this crew, working in four shifts of six hours each, is producing an average of 30 feet of tunnel in clay per day: the heading boss and an iron boss, two miners with two helpers, four muckers, four iron men, one gravel man and helper, one grout man and helper, one shield operator and two motor men. The removal of the muck at the top of the shaft was subbed to a hauling contractor who hauls it about 1.5 miles to a dump.

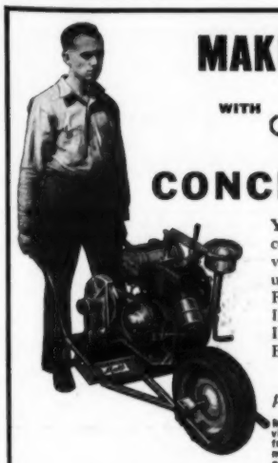
At the clay face the material runs soft toward the bottom and quite hard at the top so clay spades are used above and clay knives below.

The utilities for the operation of the work are carried on the left of the tunnel rings, as one faces the James Russell Boiler Works shield. The air line carried at about mid-height runs up to a manifold with valves and hose connections for ten lines. The electric wires for the lighting are carried just above the air line. During the early part of the work before the jumbo was completed, Mason used a Barber-Greene low-height belt conveyor for moving the muck from the muckers up into the cars, but with this it was possible to load but one car for each train and at that time the cars were pushed to the shaft by hand as the distance was small.

### The Gravel Heading

Because of the tight character of the material in the gravel heading, the progress there has been only about 8 feet for a 24-hour day. A pressure of 5,500 pounds per square inch is necessary on the twelve 70-ton Watson-Stillman

(*Concluded on next page*)

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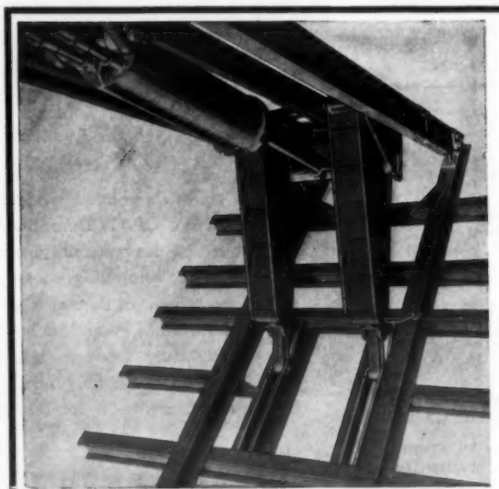

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# Silas Mason Drives Tunnel In Gravel

(Continued from preceding page)

double-acting 40-inch stroke shield jacks to force the shield ahead, while only 800 to 1,000 pounds pressure is necessary in the clay heading. The initial operation in the gravel heading was not successful, as the liner plates were not of sufficient strength to hold the material. This led to the design of a special plate, weighing some 300 pounds each, for this section. In order to handle these on the platform and to the cages, a 1-ton Yale hand hoist was installed on a jib crane. These heavy plates are used seven to a ring, with a key and a one-half plate for the 14-foot 4-inch-diameter tunnel. They are built up of a quarter-inch skin plate 67½ inches long x 2 feet wide, with end flanges of ⅜-inch plate, and reinforced with five 7.8-pound T-bars 3 inches deep and with 4-inch flanges. The side flanges consist of halves of a 15-pound 10-inch channel, all welded.

The erector arms on the shield have a special bar built by Silas Mason for handling these liner plates. A bar in the form of a cross was welded to the end of the erector arm and given a twist to tighten it against the reinforcing T's, so that it holds the plates firmly for placing.

Because of the character of the material, the timber at the face consists of 6-inch planks which are moved only one at a time. The heading crew consists of the heading boss, the iron boss, two miners, two muckers, four iron men, the shield operator, and two motor men. The muck is loaded out to the cars on a Barber-Greene belt carried beneath the jumbo similar to that used on the clay heading. Large floodlights installed close to the heading make it easy to see all parts of the work at any time. Instead of carrying the Watson-Stillman hydraulic pump on the jumbo in the gravel heading, as in the clay heading, it is carried forward on a separate car running on a second track beside the muck tracks. This is done so that it can be quickly replaced in case of a breakdown. The same type of 1¼-inch tie bars with turnbuckles are used on these heavy liner plates to hold the tunnel true immediately after the rings are erected. All bolts are turned up with air wrenches.

Because the gravel tends to break away quickly under the tail of the shield, pea gravel is shot around the rings during each shove.

### Ventilation

After the clay heading had been run several hundred feet there was some slight trouble with methane headaches so a complete ventilating system was installed immediately. A special Coppus blower driven by a 5-hp General Electric induction motor was mounted beneath the platform of the head frame, delivering air to a 12-inch diameter Ventube carried along the right-hand side of the tunnel to within 75 feet of the heading. Because of the presence of methane gas, it was deemed desirable to send the return air through the tunnel to the shaft, so three 6-inch Air Movers were installed, operated by air bled from the high-pressure air lines. These ejectors look like gigantic automobile horns.

### Shop and Compressor House

In a vacant lot about half a block from the shaft, Mason located the blacksmith shop and the compressor house with a parts and supply storage room. In the blacksmith shop are a steam trip hammer of 500-pounds capacity, a power lathe, a power hacksaw, a drill press, a power threader for pipe and a bolt threader and a forge.

The compressor house adjacent to the shop contains the three air compressors for all requirements. They operate at 115 pounds pressure for the high air and 50 pounds for the two low-air compressors. Each of the three I-R compressors is equipped with a Maxim silencer to prevent annoyance to the residents immediately around the compressor house. Each compressor has a capacity to 1,200 cubic feet per minute. The compressors were first set on a 5-foot mat of concrete with a grillage of rails for reinforcing. When the first compressor was started the whole foundation quaked. Upon further investigation by borings it was found that there was a spongy peat beneath the top layer of firm ground. The condition was rectified by underpinning the entire foundation to a depth of 20 feet.

### Personnel

R. L. Telford is Manager for Silas Mason, Inc., of New York on Sections 102 and 103 of the North Metropolitan Trunk Sewer in Chelsea, Mass. H. M. Buck is Chief Engineer for the contractor. Joseph P. Dever is Chief Engineer of the Sewerage Division, Metropolitan District Commission, with Edward Sulesky as Resident Engineer on Sections 102 and 103.

## Big Drive Launched To Finish Turnpike

From the time the frost leaves the ground this month until June 29, the deadline fixed for the completion of the 160-mile super-highway from Harrisburg to Pittsburgh, Penna., the Pennsylvania Turnpike Commission will have to place 140.8 miles of four-lane divided concrete highway and 6.7 miles of 2-lane pavement in the tunnels.

New highway paving records will be established by the furious pace required to meet the rigid time schedules. On no highway project in this country has so great an amount of pavement been laid in so short a time, as the work involved will be the equivalent of paving 300 miles of ordinary highway.

Thirty paving contractors, using about fifty complete outfits, will operate at top speed simultaneously all along the Turnpike during the big spring push. It is expected to average 3.5 miles of four-lane pavement a day, well ahead of the necessary progress to meet the time limit. Commission engineers calculate that out of 88 possible working days, 44 will be suitable for paving operations.

Tremendous amounts of materials will also be required. One day's paving will require a total of 100 cars of cement, 18,000 tons of stone, 11,000 tons of sand, and 375 tons of steel. Coarse aggregates for the concrete will be obtained from 35 quarries along the line, so located that the maximum haul from quarry to the site is 15 miles. Practically all sand for the western half of the Turnpike will come from Pittsburgh; for the eastern section, from Baltimore.

During the winter months, the Commission continued to award paving contracts well in advance of the starting date, in order to give contractors sufficient time to prepare for the spring rush. In the interval, they have been storing aggregates in approved places and moving machinery on to the job.

Construction of the seven tunnels which will take the Turnpike through the Appalachian Mountains is expected to be completed by June 15. The first tunnel, Rays Hill, was holed through on January 22.

## Cullimore Named Secretary Of Paving Brick Association

Announcement has been made of the appointment of William H. Cullimore, former Associate Engineer for the Baltimore, Md., Department of Public Works, as Engineer and Secretary of the National Paving Brick Association, succeeding George F. Schlesinger who died in December.

Mr. Cullimore, who is a native of Baltimore, has served as office engineer and later assistant highway engineer with the Department of Public Works, City of Greensboro, N.C., and in 1925 returned to Baltimore as assistant to the sewerage engineer of the Bureau of Sewers. He was then transferred to the position of associate civil engineer of highways in the city's Bureau of Highways. In 1935 he was appointed to the post in the chief engineer's office, from which he resigned to accept his new position with the National Paving Brick Association.

An associate member of the American Society of Civil Engineers and an active member of the American Road Builders' Association, Mr. Cullimore is also Vice President of the Maryland Association of Engineers.

## Heavy-Duty Rippers

The Road Machinery Division, Gar Wood Industries, Inc., Detroit, Mich., has announced two new heavy-duty rippers of identical construction except that the Model C80 has cable control and Model H80 has hydraulic control. They are designed for operation with a 70-hp tractor, and are equipped with three teeth spaced 44 inches center to center, which will penetrate to a depth of 29 inches and may be raised 11 inches above the ground for transportation.

More complete information on these two heavy-duty units will be found in Bulletin R-184 (hydraulic control) and Bulletin R-185 (cable control), which may be secured direct from Gar Wood.


'Ramsey'
3-SPEED ALL-STEEL HAND WINCH

2 Sizes

5-ton capacity — 135-lb. spools, 325' of ½" cable, $75.
3-ton capac'y — 75-lb. spools, 150' of ½" cable ..... $55

POWER FOR HEAVY LOADS. SPEED FOR LIGHT LOADS. Gear Ratios: 25:1, 4:1, 1:1.

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Bank Sloping Revolutionized!

SPEED EFFICIENCY

- Slopes banks rapidly.
- Easily attached to any shovel in an hour's time.
- Will cut any slope that a shovel can dig through.
- Controlled entirely from operator's seat.
- Will cut through sand, gravel, soil, clay and broken rock in one operation.

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ETNYRE

BLACK TOPPER
ROAD BUILDING SYSTEM

One of the new TD-14 TracTracTors with an Austin-Western 5-yard scraper.

## Three New Tractors By International

A year ago, the Model TD-18 diesel TracTracTor, the largest in the International crawler tractor line, was announced by the International Harvester Co., 180 No. Michigan Ave., Chicago, Ill. For 1940, this company has announced three new similarly styled and engineered diesel crawler tractors, known as the TD-6 TracTracTor, the smallest of the three new models; the TD-9, next in size; and the TD-14, the largest of the three.

Thus, with the TD-18, the International diesel crawler line now consists of four sizes, with drawbar hp ranging from 30 for the TD-6 to more than 70 for the TD-18. A TracTracTor of the same size as the TD-6 and to be known as the T-6 will soon be available with a combination gasoline-distillate engine.

Each one of these new models is equipped with a full diesel engine, provided with a method for starting whereby the engine starts on gasoline and after about a minute of operation shifts to full diesel operation. The new TD-6 and TD-14 respectively have more power, wider speed range, and greater adaptability than the TD-35 and TD-40 which have been in the field for several years. The TD-6 is entirely new and is the smallest International diesel tractor ever developed.

Five forward and one reverse speed in the TD-6 and 9, and six forward and two reverse speeds in the 14 and 18 models are provided by a selective type of transmission which, in combination with the variable speed engine governor, makes possible the close selection of the correct speed and the economical use of power in various types of loads from slow heavy pulls or pushes to fast return hauls.

A heavy one-piece main frame forms a rigid backbone for each tractor. Assembly of parts is by the unit system, by which the engine, radiator, each steering clutch and brake, track-frame assembly and other parts can be adjusted or replaced without disturbing adjacent parts. All working parts operate in separate dustproof and watertight compartments, some in oil baths and others dry. The same type of track frame and stabilizer construction used on the TD-18 is now standard for all diesel TracTracTors, assuring free oscillation and positive alignment of the tracks under all conditions, maximum track-to-ground contact, higher travel speeds, and easier handling of the tractor, according to the manufacturer.

Other features include the over-center clutch with low-inertia driven members and automatic clutch brake for fast gear shifting; adjusting steering levers and pedals to suit the operator; track shoes keyed to track links to eliminate loosening of shoes; full-pressure engine lubrication at all working angles by multiple-gear oil pump; thermostat-controlled centrifugal pump cooling system; and quintuple-sealed track rollers to keep out dirt. Each tractor is available in two treads, and track shoes are available in a variety of sizes and types.

## Helm Re-Elected President Of The Asphalt Institute

At the annual meeting of The Asphalt Institute, representing three-quarters of the asphalt-producing industry of the United States and Canada, Joseph S. Helm of the Standard Oil Co. of New Jersey was re-elected President for the fiscal year beginning April 1, 1940.

Other officers elected were: Vice Presidents, A. M. Maxwell of Standard Oil Co. of Ohio, J. A. Blood of Standard Oil Co. of California, and T. M. Martin of Lion Oil Refining Co.; Treasurer, Herbert Spencer of Standard Oil Co. of New Jersey; and Secretary, F. V. Widger of the Texas Co. W. H. Kershaw of the Texas Co. was elected Chairman of the Executive Committee, with J. A. Blood, J. S. Helm, T. M. Martin, and David Waxman of the Shell Petroleum Corp. as members. J. E. Pennybacker was again reelected Managing Director of the Institute.

It was announced that figures for 1939 show asphalt consumption at 6,192,000 tons, an all-time high 7 per cent above the previous high record made in 1938. Of this, 75 per cent went into highways, slightly under 20 per cent into building construction, and the balance into miscellaneous uses. The increased use of asphalt for highways is ascribed to the increasing demand for low-cost farm-to-market roads. In 1928, asphalt for low-cost roads comprised one-third of the tonnage used for highways, while in 1939 it had grown to two-thirds of the tonnage.

## Electric Haulage For Friant Gravel

Diesel-electric locomotives are being put to a new use at the site of the $16,000,000 Friant Dam in California, marking the first application of this type of motive power to construction work. Three of these industrial-type units have been supplied by the General Electric Co. to the Griffith Co. and the Bent Co., contractors for this project.

Two of the locomotives, operated in multiple by one engineer, are being used to move aggregate from the gravel plant to the storage piles at the dam site, about 2 miles distant. This double unit weighs 86 tons and rates 600 hp. The third, rated at 300 hp and weighing 43 tons, is used for switching and auxiliary service, and may also be used in tandem with the other locomotives when needed.

Friant Dam, the second major unit in the Bureau of Reclamation's Central Valley Project in California, will be located on the San Joaquin River about 20 miles north of Fresno and, when completed, will provide storage for 520,500 acre-feet of water, 316,500 of which will be available for storage regulation of waters for delivery to the Friant-Kern and the Madera canals. With a total length of nearly 200 miles, the canals will carry a supplemental water supply to more than 400,000 acres of productive farm land now suffering for lack of adequate water supply. The dam will be 3,430 feet long, 300 feet high, 250 feet wide at the base and 20 feet wide at the crest. It will contain 1,850,000 cubic yards of concrete.

## Wire Rope Important In Road Construction

To get top profits and the desired results in road building and maintenance, it is important that your machines be equipped with the proper size and type of wire rope in order to secure maximum-production economy. Shovels, cranes, draglines, dirt-moving scrapers, bulldozers, mixers and pavers are all dependent on the performance of the wire rope with which they are equipped to do their jobs properly.

In a handy pocket-size folder just issued by the American Cable Division, American Chain & Cable Co., Inc., Wilkes Barre, Penna., manufacturer of Tru-Lay preformed and Crescent non-preformed wire rope, there appears an interesting and helpful summary of wire rope recommendations for contractors, applying particularly to equipment used in road construction and maintenance.

Copies of this folder, which includes tables of strengths, weights and prices of commonly used wire ropes, may be secured by interested contractors and state and county highway engineers direct from the American Cable Division at the address given above.

## Hoisting Equipment For All Types of Service

"Lifts and Pulls," a 65-page magazine issued by the Willamette Hyster Co., Portland, Ore., describes and illustrates the line of Hyster hoists for mounting on Caterpillar tractors to provide modern mobile hoisting equipment for all types of service. The many illustrations in this publication show Hysters in service on dam construction, clearing land for new highways, bridge erection, material handling, pile driving, at sand and gravel plants, for dragline excavation, on dredges, and for many other types of work.

Copies of "Lifts and Pulls" may be secured by interested contractors and state and county highway engineers without obligation by writing direct to the manufacturer.


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Z-METAL PEELER!

HERE'S WHAT THIS MEANS TO YOU

Standard equipment on all Rex Speed Prime pumps is the Z-Metal Peeler—a sharp-edged casting of corrosion and wear-resistant Z-Metal which removes the air from the impeller, prevents air from rotating around the impeller when the pump is priming, or when the suction line is leaking air. The Peeler gives Rex Speed Prime pumps more air-removing ability than any other good contractor's pump. It enables them to prime faster, hold their prime longer—day in, day out—year in, year out!

Z-METAL IMPELLER, TOO!

The unique Rex impeller, which retains its ability to prime after long years of wear, is made from Rex Z-Metal—an exclusive Rex Speed Prime feature. Z-Metal's strength, toughness and ability to resist abrasion are far greater than malleable iron or semi-steel found in ordinary contractor's pumps. Thus, internal losses are less in your Rex Speed Prime pump. High efficiency is maintained over longer periods of hard work.

Here is the brief, concise story of the superiority of Rex Speed Prime pumps! Be sure you've read it before you buy any pump! Send for your copy. Ask for Bulletin No. 365. Chain Belt Company, Dept. P-4, 1666 W. Bruce Street, Milwaukee, Wisconsin.

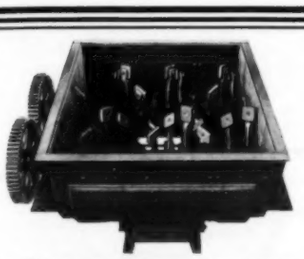
BUY REX AND BE RIGHT!

PUMPS



THE SIMPLICITY MIXER—*Has These Advantages!*

- Double "Figure-eight" mixing action. Faster—more thorough mixing.
- Full size mixer box—ample volume below shafts—SKF anti-friction bearings—Requiring less power than other mixers of equal capacity.
- Two large dump doors (with manganese liner plates)—Rapid dumping and complete emptying.
- For—Better Production—Better Mixtures—Longer Mixer Life—Greater Dependability—and Lower Cost, the Simplicity Mixer is the last word.



The Simplicity Plant Is More Portable

Hinged tubular columns and hinged elevator bases for erection the simplest way.

Designed for separation into the most compact and easily handled units, portable by truck and trailer.

Organized dismantling and erection make the Simplicity Asphalt Plant more portable than any plant of equal capacity. Capacities—from 25 to 200 tons per hour.

WRITE FOR DETAILS.
NO OBLIGATION.
NO ANNOYANCE.

THE SIMPLICITY SYSTEM COMPANY
CHATTANOOGA, TENNESSEE

DEPENDABLE

# Care in Grading Job Wins Award for Lowe

(Continued from page 29)

At Sta. 340, a row of elms and maples on the south side of the road was saved, drainage being taken care of by a shallow ditch. Then, 40 feet north of Sta. 376+90, the backslope was pulled in to save a hard maple. To preserve a row of spruce 33 feet north of the center line at Sta. 399, the contractor constructed the drainage ditch in a very pinched area and without damage to any of the trees. An oak north of Sta. 421 and trees on both sides of Sta. 425 were saved, making it necessary for Lowe to work around them.

South of Sta. 470, the ditch was built behind a cluster of trees. A small parking area or turn-out was constructed between the trees and the road. Two ditches were constructed, one to take care of the water discharged by the flumes and the other to take care of the water from the culvert at Sta. 473+24. A bulldozer was used to shape the parking area so as to avoid injury to the branches of the trees.

North of Sta. 472 and from Sta. 473 to 476 south of the center line, many trees were saved at the break of the backslope. From Sta. 476 to 480, on the north side of the road, there was a dense growth of trees of all kinds. The contractor thinned out this grove, using exceptional care in felling the trees so as to cause no damage to the trees left standing. Here again, a bulldozer was used to shape the area, and approaches were built to allow the public to use this location as a roadside park.

South of Sta. 512 to 514+50, the ditch was constructed back of hard maples, pines and elms. Around Sta. 520, Lowe left mounds to preserve two elms and a pine. At this point the material was excavated with a dragline instead of the elevating grader used on most of the job, in order to avoid injury to the trees.

### The Contractor

G. H. Lowe is well-known in contracting circles in Iowa, where he has been engaged in construction since 1925. A native of Hadley, Minn., he started in the contracting game in 1917, his first contract being for hauling drainage tile and his equipment consisting of one team, a wagon and some harness. In 1920 he was awarded his first grading contract near Pipestone, Minn., and has continued successfully in that type of work ever since.

In completing work in more than half the counties in Iowa, Lowe has encountered a wide variety of material and job conditions. Some of his work has included excavation for an underpass at Ames, a number of overpasses, rock excavation, channel changes, shoulder work on paving jobs, excavation for railroads and private companies, roadside development, and he recently completed a dam for the water-works improvement project for Winterset, Iowa.

At the present time, Lowe who conducts his business as an individual, is not incorporated and has no partners, operates two dragline outfits, one shovel, one elevating grader, and one power-scraper outfit. He maintains an office and repair shop at Cedar Rapids, which has been his home since 1928.

Lowe has been active in the Central Branch of the Associated General Contractors, having become a member in January, 1929. In January 1931 he was elected to the Association's Board of Directors for a 3-year term, and was re-elected for another term in 1934. He was one of the Association's Vice Presidents in 1932 and 1933 and has served on many of the more important committees. He is also a member of the American Road Builders' Association.

The new Mall high-speed vibrator.

## A New High-Speed Electric Vibrator

The new Mall concrete vibrator, recently announced by the Mall Tool Co., 7743 So. Chicago Ave., Chicago, Ill., is a ½-hp high-speed universal short-coupled vibrating unit delivering 6,000 vibration frequencies per minute. The vibrator is constructed of the toughest materials to withstand the abrasive action which takes place during operation, and the tip is welded with special metals to give the maximum hours of performance.

The motor is of the universal type and can be furnished for operation on 110-volt alternating or direct current, 25, 50 or 60-cycle, or 25, 50 or 60-cycle 220-volt ac or dc. The unit is equipped with a switch built into the handle, 25 feet of 2-conductor cord and plug. There is a short-couple flexible shaft and housing between the motor and the vibrator, the housing being 18 inches long and the flexible shaft being 7/16-inch in diameter. The vibrator is 2⅛ x 14 inches, the overall length of the tool is 43 inches and the total weight, 27 pounds.

A new bulletin describing and illustrating this latest tool in the line of Mall vibrators may be secured by those interested direct from the manufacturer.

## New B-E Dealers in Texas

The R. B. George Machinery Co. of Dallas, Texas, and the R. B. George Tractor & Machinery Co. of Amarillo, Texas, with branches at Tyler, Abilene and Lubbock, have been appointed distributors in the northern half of Texas for Bucyrus-Erie ⅜ to 2½-yard shovels, draglines, clamshell and lifting cranes. These two companies have, during the twenty-four years of their existence, built up one of the large road machinery businesses in Texas.

The southern half of Texas will continue to be served by the Gulf Tractor & Equipment Co. of Houston and the Tri-State Equipment Co. of El Paso. All Bucyrus-Erie distributors in the state work with the cooperation of E. B. Chambers, B-E Dallas representative.


STERLING BALANCED WHEELBARROWS

*All trays have double thickness at corners. Both laps are crimped over a continuous butt-welded reinforcing rod.*

No. S-12 Barrow—For Dry Materials

Can Be Equipped with Solid Rubber or Pneumatic Tire Wheel

A COMPLETE LINE OF STERLING WHEELBARROWS AND CONCRETE CARTS

STERLING WHEELBARROW CO., MILWAUKEE, WIS.

LA CROSSE Heavy Duty TRAILERS

The most complete line on the market. Capacities, five to two hundred tons. Four to sixteen wheels. Two to eight axles. They are built to take the heaviest loads safely, and with the least damage to road beds. Write today. Just tell us what you have to move.

THE LARGEST TRAILER IN THE WORLD IS A LA CROSSE!

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TORO Bullet Highway Mower

Hercules 60 H.P. Engine Speeds from 1 to 40 M.P.H. Hand or Power Lift Sickle. Automatic Throwout. Beautiful Streamlines.

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*Built by Specialists for Specialists*

You can't make a silk purse out of a sow's ear and you can't take a farm tractor that was built for cultivating and plowing and make it into a modern Highway Mower.

The Toro Bullet was designed by mowing machinery specialists who understand what is wanted and what is needed. It is not made over, revamped, converted or a combination of this and that.

Buy your Highway Mowers from specialists and you will get one that will really do the job and no fooling.

TORO MANUFACTURING CORPORATION

MINNEAPOLIS MINNESOTA

Cross section of a Schrader valve cap.

## New Tire Valve Caps Protect Your Tires

Truck tire valves are today more than ever a part of the inner tube of the tire. The rugged casing or tire which absorbs the wear and tear of road contact provides no protection to this vulnerable part, and damage within this exposed portion of the tube can cause annoying and expensive delays.

The standard Schrader valve cap is designed not only to shut out dirt but also to seal the opening of all standard tire valves, making them air-tight up to 250 pounds pressure. This valve cap consists of an outer body or shell, within which is a dome-shaped brass swivel plate which allows the cap shell to turn independently of the rubber washer as the cap is applied. This assures proper seating of the washer and prevents distortion of it. Next is a brass dome-shaped plate which provides an indestructible chamber for safe clearance of the valve core pin. A moulded rubber washer seals the valve mouth when the cap is screwed on firmly by hand, while the rubber between the swivel plate and the dome-shaped plate provides spring action to maintain a positive seal.

Standard Schrader tire valve caps are stocked by tire branches, jobbers and dealers throughout the country. Detailed information on these valve caps and the names of dealers where they may be secured in any locality in the United States may be secured direct from A. Schrader's Sons, 470 Vanderbilt Ave., Brooklyn, N.Y., or from this magazine.

## A New Maintainer With Attachments

A maintenance outfit, particularly adapted to secondary roads with gravel or light bituminous surfaces, based about an International Farmall tractor, was exhibited by Good Roads Machinery Corp., Kennett Square, Penna., at the 1940 Road Show. This maintenance outfit is made in five sizes, each with the same equipment except for the lightest unit.

A sturdy frame built onto the Farmall tractor is made to carry a scarifier, a roller, a brush attachment or a center blade maintainer. In addition the same frame can carry a V-plow or a center plow if desired, or the tractor can be used for normal operation as the frame does not interfere with this in any way.

The scarifier carries 12-inch teeth capable of digging to a depth of 6 inches and made of hard tool steel. Sharpened at both ends they are reversible for longer wear. The scarifier is interchangeable with the blade by merely removing two large bolts. The blade is 13 inches high and varies from 7 to 10 feet in length, depending on the size of the tractor, and has proved effective in maintaining gravel and dirt roads, shoulders on paved roads and other similar work.

The roller attachment, which is also mounted in the same position as the blade, is 12¾ inches in diameter and 5 feet long and gives a variable pressure, depending on the weight of the entire unit. The brush attachment is made of flexible steel wire tufts and can be used to maintain surface material on unpaved roads without breaking the bond of first course material below. It is also mounted in the same position as the scarifier, blade and roller.

The V-plows used on this maintainer are 5 feet wide, 24 inches high at the front and 33 inches high at the back. Complete information on this versatile maintainer and all-'round service unit will be furnished by Good Roads Machinery Corp. promptly to those mentioning this item.

## Air-Line Lubricator

Designed primarily for rock-drill lubrication, the new Oil-IR air-line lubricator can be used on many kinds of air-operated tools. Its body construction consists of heavy steel tubings and forgings. Adjustment of the oil feed can be made without taking the pressure off the chamber and without interrupting the work. The manufacturer states that this lubricator will not siphon back or leak when air pressure is released. It can be filled in either a vertical or horizontal position.

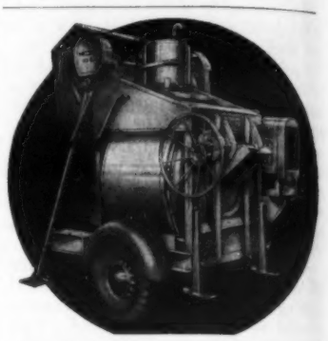
Form 2600, containing detailed information on this new Oil-IR lubricator, also contains a valuable discussion of what happens to air-operated tools if they do not receive proper lubrication. Copies of Form 2600 may be secured by those interested direct from the Ingersoll-Rand Co., 11 Broadway, New York City, or from this magazine.

## Easy Intercommunication On Construction Projects

Engineers and contractors are finding the new battery-operated portable Twinphone intercommunication systems a great time saver and efficient aid on all kinds of construction. Since the master station operates on its own power, it can be carried anywhere on the job to give instant 2-way contact with the office or any other part of the job. The Twinphone master station can be used with one or more substations which may be either high-powered trumpet types or regulation office models. Calls may be originated at both master and substations.

This communication system is sufficiently sensitive that a foreman or workman can both hear and answer a question addressed to him from the nearby substation without putting down his tools or leaving his work. This speed in securing needed information is not only a great convenience but, by eliminating interruptions, it results in a measurable saving in the productive workhours of high-priced men.

The portable Twinphone master station, Model 402M, comes complete with three Eveready batteries, and the substations are priced at about one-third the master station. Complete information, including prices, may be secured from Executone, Inc., 415 Lexington Ave., New York City, by mentioning the source of this information.

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- AUTOMOTIVE-TYPE TRANSMISSION, 30% to 40% more efficient, quieter, longer lived.
- HIGH CARBON MACHINED STEEL DRUM TRACKS, on chilled, ground rollers.
- 5S TO 14S ALIKE IN ALL BUT SIZE—real heavy duty service in light, fast, end discharge trailers with 2 or 4-wheel mounting "interchangeable. Jaeger Criss-Cross "Rex"-Mix Drum, Skip Shaker Loader, fastest "Pressure" Discharge — features that have made Jaeger the world's biggest selling line.

3½S with Measuring Batch Hopper Mixes 30% to 40% More!

Send today for new catalog and prices.

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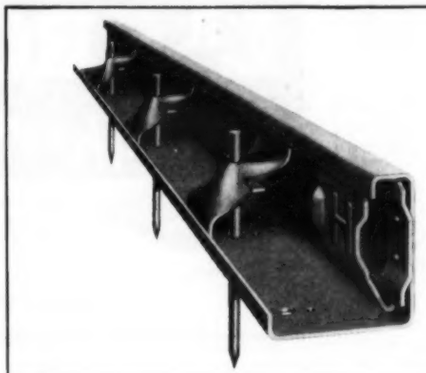

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1. **By building more miles of concrete slab.**
2. **By elimination of expensive upkeep and repairs.**

**. . . and because Heltzel forms are easier to set and strip — form setting costs are reduced to a minimum. Write for complete information and descriptive literature. Catalog S-19.**

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BINS, Portable and Stationary
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CENTRAL MIXING PLANTS
BATCHERS (for batch trucks or truck mixers with automatic dial or beam scale)
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FINISHING TOOLS FOR CONCRETE ROADS

**HELTZEL** STEEL FORM & IRON CO.
WARREN, OHIO · U. S. A.



"One truck with a litter of bodies"

Mr. CONTRACTOR:
Why do it "the hard way" when you can save 50% or more the LOAD LUGGER way

Here is the answer to your *hand loading problem* . . . because one truck unit operating with a set of 5 to 10 dump-buckets will do as much as a whole fleet of transport trucks . . . at less equipment cost. The work is easier for the men, loading the buckets on the ground at shovel level. Pick-up or dump takes less than 20 seconds with the double hoist action . . . all operations controlled from the cab. Ask about the latest Model "CH" Load Lugger . . . it will cinch your profits on every job.

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KNOXVILLE, TENNESSEE
704 Davenport Road

Built in sizes from 1½ to 4 cu. yds. capacity

# Deep Cuts and Fills For Penna. Turnpike

(Continued from page 25)

¾-yard Lorain was put in along this section and moved to other work as required.

### Slag Pile and Long Fill

The next problem was carrying the Turnpike adjacent to the old Everett-Saxton slag piles. Due to some question as to the title to these slag piles, work in this section was delayed for some time. The cut was finally made with a D7 tractor and La Plant-Choate bulldozer.

The relocation of the township road ended at the easterly end of Mt. Dallas immediately followed by a 3,000-foot fill with a maximum height of 30 feet at the easterly end and not quite as high at the west end. At a distance of 12,500 feet from the west end of the contract, there is a series of structures, mentioned in our opening article as seeming to be dropped from the sky, as without the approach fills there seemed to be no rhyme or reason for their location. There is an arched drainage culvert through this area, a 20-foot span arch culvert under the Pike, and then an underpass for Township Road 05018 which will receive traffic from 05039 and take it into Everett, and then there is a small slab drainage structure under Township Road 05039.

### Work at Warrior Ridge

Warrior Ridge, the next hill to the east, looked like a tough job for any contractor to crack, with a 106-foot deep cut in rock. When Nello L. Teer tackled this Ridge, it was found to be of disintegrated sandstone easily handled by Carryalls. The Turnpike goes across Warrior Ridge and to an overpass over a state road and then over a large fill made from the excavated material from the Ridge, using five LeTourneau Carryalls pulled by D8's, the fill being trimmed by a bulldozer and a Galion motor grader and then rolled with two Buffalo-Springfield 10-ton 3-wheel rollers. This fill is 70 feet high with an arched underpass at the east end to carry the traffic of the old "Milk and Water Route" under the Turnpike. The origin of this unusual name is somewhat lost in antiquity, but it is believed to be the single route out through the mountains to an accessible water supply for the people of Everett and for the delivery of milk from upland farms into the community.

### The Doll House and Fossils

Perched at the westerly end of this high fill was a one-room house originally located on the state route. This small structure, nicknamed "The Doll House," did not have a clear title, so that it could not be acquired or even moved from its site. It therefore remained in the middle of the fill for many weeks before the contractor was permitted to put it on a single truck and carry it away to its new home.

The Turnpike goes over the arch culvert at the east end of this fill into a hard limestone cut 40 feet deep and containing some 60,000 yards of hard rock excavation. This cut, like several others on the line of the Turnpike, had water-bearing strata at an elevation well above the adjacent country. Furthermore, the cut was filled with fossils. Drilling in this cut was done with four Gardner-Denver wagon drills equipped with Timken detachable bits and powered by two Gardner-Denver 315-cubic foot and one Gardner-Denver 210-cubic foot portable air compressors delivering to a 3-inch and a 2-inch pipe line laid in the cut to the wagon drills. The holes were driven to a depth of 20 feet and then loaded with 40 and 60 per cent Austin dynamite, shot from a line from one of the 5,000-watt portable lighting plants. The material was then loaded out to six Euclid crawler wagons by a Lorain 1¾-yard shovel.

C. & E. M. Photo

**One of the cuts on the Nello L. Teer contract involved 60,000 yards of rock excavation. A Lorain 1¾-yard shovel loaded the blasted rock into Euclid crawler wagons.**

In the cut described, the drainage pipe consisted of 15 to 54-inch reinforced-concrete pipe and 48 to 60-inch corrugated-metal asphalt-coated Armco pipe. A 210-cubic foot Gardner-Denver portable compressor was used for operating the Thor mechanical tampers which were used to pack backfill around the drainage pipe so that there would be no settlement of the trench over the transverse drainage lines. Three 5,000 watt Kohler light plants were used by the contractor on the various cuts and fills to expedite night work.

### The Repair Shop

The contractor had a very complete repair shop located at the top of the fossil cut at the east end of this contract. Here the shop was completely out of the way and yet was readily accessible by farm roads which temporarily have entrance to the Turnpike. Another similar shop was also located at the west end near the contractor's office. The east-end shop was equipped with two Hobart welders and the usual mechanical equipment necessary for the proper maintenance of the large amount of crawler equipment used at this end of the job.

### Personnel

For Nello L. Teer, Durham, N.C., contractor on Contract 44, Section 13D, George Johnson was Superintendent, with Charles P. Waller, Assistant Superintendent, and L. B. Jenkins and John Richey as Civil Engineers for the contractor. For the Pennsylvania Turnpike Commission, George L. Brockway was Resident Engineer.

## Vibration vs. Hammer To Make Sand Flow

Many contractors have experienced considerable trouble in making concrete aggregate and cement flow freely from storage hoppers into batch weigh hoppers. Using a sledge to pound the delivery spout results in eventual damage to the bins and excessive replacement costs.

The McClean Construction Co., which is finishing up the new highway bridge at Havre de Grace, Maryland, has completely done away with hand pounding on any chute or bin to make the material flow readily. Instead, they have attached Syntron vibrators to the cement, sand and aggregate bins, as well as to the feed chutes leading to the concrete mixers, in order to induce a free flow of material into the batch weigh hoppers and then into the mixers. This company reports that the complete installation of vibrators has speeded up the production of concrete on the barge plant by about 25 per cent and has changed an unprofitable job to a profitable one.

Form 257, issued by Syntron Co., Homer City, Pa., describes in detail Syntron electric vibrators as used in this manner. Copies of this will be sent free on request to interested readers.

**A V-75 Syntron vibrator on the bulk cement hopper of the McLean Construction Co.'s concrete mixing plant for the highway bridge at Havre de Grace, Md.**


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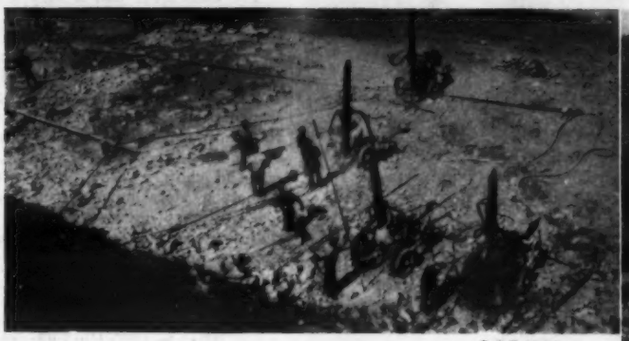
Contractors and Engineers Monthly

Above, an artificial cyclone during the process of cleaning the base of a road in Madison County, Alabama, prior to a double bituminous surface treatment with tar. At right, applying the prime coat. Madison County has so improved 50 miles of the more heavily traveled highways in the past four years and plans to continue the program until no resident is more than 4 miles from a treated road. See page 7.



C. & E. M. Photos

A fleet of wagon drills working in a rock cut east of Warrior Ridge on the Nello L. Teer contract for one section of the Pennsylvania Turnpike. At right, a view on the same contract, looking west and showing, in the foreground, the compressor fleet, then the arch underpass, fill, another underpass and, in the distance, Warrior Ridge cut. See page 25.

C. & E. M. Photos

Jack Quinn, Inc., contractor of Miami, Fla., uses this No. 9 Buckeye ditcher, powered by an International PD-80 diesel, to obtain crushed coral rock for road building. The unit averages 50 feet of travel an hour, securing about one yard of rock per foot of travel.

Steel erection by the Bethlehem Steel Co. on the new bridge across the Cedar River at Waterloo, Iowa. This new steel and concrete structure provides a sorely needed additional span to take care of cross-river traffic. See page 2.

Below, a "rails'-eye" view of the recently completed overpass at East Ely, Nevada, which eliminates a perilous hazard to traffic, and, in the insert, A. G. Kinne, Resident Engineer for the Nevada Department of Highways on the job. See page 21.

The road-building outfit, consisting of a D7 tractor and Carryall and a Caterpillar No. 12 diesel motor grader, used by Bureau County, Ill. See page 33.

C. & E. M. Photo

The Jahnig & Davis tractor and scraper outfit at work on a 6.5-mile grading job between Lynd and Russell, Minn. The bulldozer on the slope did all the necessary trimming.. See page 1.